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Coal Gasification

FIRST EXPERIMENTAL TRIALS IN YORKSHIRE

WHAT is the fuel problem in this country generally? One may presumably answer that it is the provision for the community of the maximum benefit obtainable from the potential heat value of the fuel.

Fulfilment of that object is not likely without some co-ordination of the fuel and power industries; indeed, recognition of this premise was supposedly one of the chief reasons for creating the Ministry of Fuel and Power, so regard must be had for both aspects of the subject.

Using Uneconomic Resources

Before a sound policy can be evolved it is important to examine tendencies in consumption so as to determine the manner and degree in which trends in usage are likely to affect the most beneficial employment of resources. Coal is Britain's principal fuel and, as it is the only real (also diminishing) national asset, an attempt should be made to conserve the more accessible deposits by trying fresh means of utilizing those which it is not economic to work by conventional mining. Hence the experiment in direct gasification underground which, as mentioned on another page, the Ministry has lately embarked upon.

This means of treating raw coal seems to have been proposed in Russia more than fifty years ago, and has been practised there for fourteen years; though successes have been claimed, little information has become available. Much more is known about exploratory work that has been done in the United States, Belgium and Italy, but the results in those countries, while interesting, have been inconclusive up to now.

So far as Britain is concerned, advisers of the Ministry of Fuel and Power have been studying the many aspects of this process since 1944 in consultation with research workers at home and abroad. Owing to the plentiful supplies of cheap coal of good qualities that have been available in this country, there has not been any incentive hitherto to gasify it *in situ*, but in present circumstances such treatment may promise to be one way of assisting to enlarge the total amount of fuel that will be available to home industries in future; for example, by the utilization of thin seams of poorer coal between thick layers of dirt which are not economical to mine by traditional methods.

Proposed Use in Gas Turbines

Even so, it is problematical whether this Ministerial experiment would ever have been attempted had the gas turbine not been developed to the stage it has already reached. The gas turbo-generator is believed by the Ministry to be the most suitable machine for burning gas of low calorific value derived in this way for augmenting the national electric power system. The reason is that this machine, more conveniently than most others, can be designed for transportability from one gasification site to another as each becomes exhausted in turn.

The calorific value of the gas is not ex-

pected to be high but the site chosen is unusually well suited to experimental work. The information it is hoped to gain on this "open air laboratory" scale should be valuable and additionally useful for comparison with data which, no doubt, will be collected in due course about the burning of pulverized coal in gas turbines.

FLEMING CENTENARY

THE centenary of the birth of John Ambrose Fleming, at Lancaster in 1849, occurred on the 29th November and was marked by the exhibition of a talking film (recorded eleven years before his death) at the I.E.E. last week. Like others of his day who wished to become engineers, he could not afford the approved "pupilage" method so he trained as a chemist. Slowly but definitely he turned over to physics and mathematics, eventually becoming an outstanding electrical engineer. For nearly forty years he occupied the chair of electrical engineering in the University of London and by the invention of the thermionic diode valve in 1904 he ushered in a new era of long-distance communication by radio and wire, contributing also to the foundation of what is now called electronic engineering. Sir Ambrose died in 1945 at the age of ninety-five still in possession of all his faculties.

NEXT E.C.A. CONFERENCE

IT is interesting to learn that the Electrical Contractors' Association is to continue its annual conferences and will meet at Hastings next May. The date is of interest, too. This year the conference came after the British Electrical Power Convention and maybe suffered somewhat from that fact. In 1950 the E.C.A. will get in first and thus should attract more attention.

PLANT LOADING

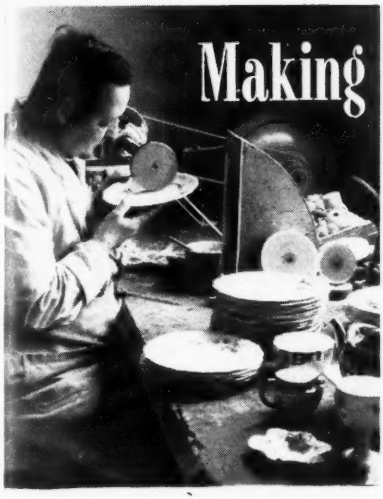
THE prevailing inadequacy of power station capacity renders it unnecessary to stress the obvious way in which the manner of loading generating plant can influence the economy with which electricity is produced. The mathematically correct method outlined in the article entitled "Economy Loading of Generating Plant," presented on another page, has been successfully employed by many large power companies in the United States, but has not, until recently, received any serious consideration in this country. In the practical use of any system of load allocation within a large power network, the fundamental basis is often obscured by a multiplicity of irrelevant detail. This article has, therefore, been written with the idea of setting out the facts in the simplest way possible with the intention of illustrating the correct foundation on which any load-dispatching system should be built.

ENGINEERING WAGES

IN the face of the recommendations of the General Council of the Trades Union Congress, the engineering and shipbuilding unions, headed by the Amalgamated Engineering Union, have decided to press for an all-round increase of £1 a week for their members. Their spokesman, Mr. Brotherton, claimed at a meeting with the employers last week that the increase (calculated to amount to £100 million a year) could comfortably be paid out of profits. The figures adduced to back this contention cannot, however, be taken without a number of qualifications which seriously reduce the validity of the argument. A rise in the prices of engineering products would certainly result from the granting of the claim and these products form a substantial proportion of our export trade.

BUILDING CUTS

ANY reduction in building work affects the electrical contracting industry adversely and a cut in "private" building, such as that now being made by the Government, is likely to touch the "private" contractor more than the "public" contractor or Electricity Board. It is poor comfort for contractors and other building specialists to learn from the Minister of Works that the reduction will be only 8 per cent, for that cut is imposed on a strictly controlled volume of work. It may be hoped, however, first, that the slowing down will not be of long duration and, secondly, that it will not discourage employers from training an adequate supply of apprentices or dissuade suitable boys from entering an industry which must always depend upon skilled craftsmanship.



Making Fine China

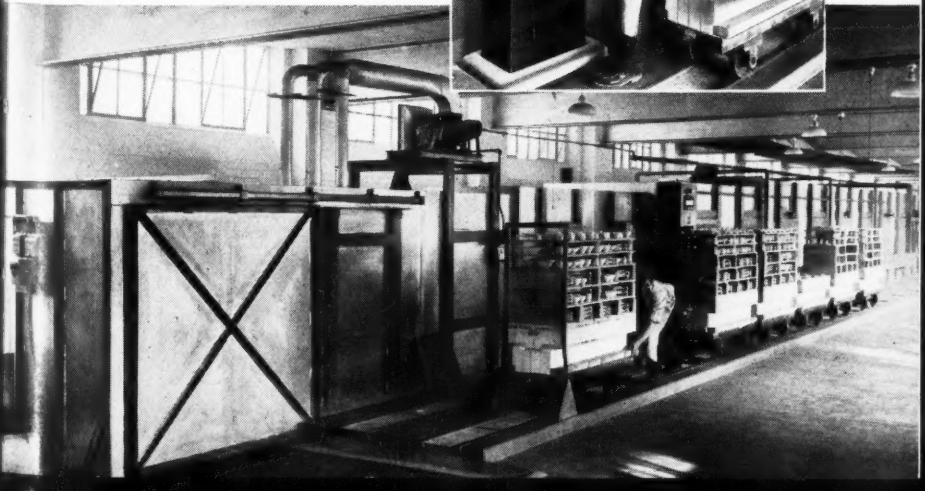
Electrical Methods as an Aid to Production

AN even higher average quality of product and an increase in output will result from various electrical methods now being introduced at the Royal Crown Derby Porcelain Company's factory at Derby. When the full extension programme has been completed in about two years' time the company will possess the most modern plant in the country producing fine china exclusively.

While the installation of a new electric glost oven is the most recent and probably most important innovation, the electrification of the factory has been proceeding gradually over a number of years. It is therefore interesting to see the extent to which electricity has now come to be regarded as indispensable in an industry which, on account of its long history, might have been excused for being conservative in its outlook. Certainly, though basic processes may not have altered much, the way in which they are now carried out differs very considerably from those employed two hundred years ago when William Duesbury first commenced manufacturing china in Derby.

Polishing the finished china at the Royal Crown Derby factory is shown in our title picture

General view of new glost oven and (right) the centre section showing Electroflo board

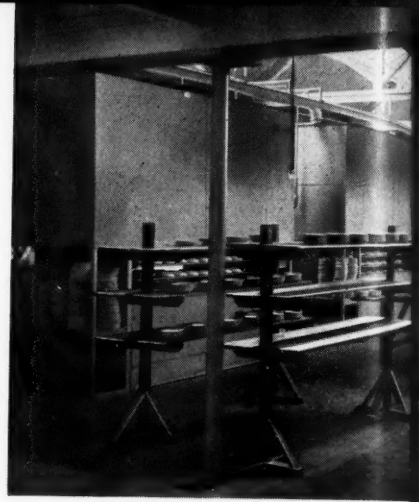


The raw materials, china clay and stone from Cornwall and calcined animal bone mainly from Argentina, arrive at the works ready for use, the stone being tinted with a vegetable dye to distinguish it from clay. These are processed in the sliphouse. In correct proportions, together with water, they go first to Edwards & Jones mixing machines driven by 10 h.p. Crompton Parkinson motors. The mixture produced, "slip," is filtered through copper wire lawns and then passed through electromagnetic screens (Electromagnets, Ltd.) to remove any stray ferrous particles which, if left in, would cause discoloration of the ware.

The slip then goes to storage tanks or arks, where it is kept agitated, motive power being provided by 10 h.p. Crompton Parkinson motors which drive the mixing plant. The liquid clay or slip is then pumped into a press which squeezes out most of the water and produces slabs of clay about 18in square by 2in thick. These slabs then go to a pugging mill (7½ h.p. 1,430 r.p.m. Crompton Parkinson motor), which chops it up into small pieces, removes entrapped air, and finally emits it in the form of a thick sausage about 6in in diameter. The clay in this form is used for making flat ware such as plates, which are produced on plaster moulds on revolving wheels, reminiscent of the old potters' wheels. For making cups, jugs, bowls, etc., which are known as hollow ware, the clay is used in the liquid form (slip) and is transferred to the Casting Department on the floor above through pipes, with the aid of a pump driven by a 2 h.p. Brook motor.

In the casting room the slip is poured from jugs into plaster of paris moulds which rapidly absorb the water content and cause a deposit of clay to form on the surface. As soon as this deposit is of the required thickness the remainder of the slip is poured off. The moulds with the clay shapes inside are then placed in drying stoves to dry the moisture out of the clay. The clay shapes are removed from the moulds and fettled before firing.

When making flat ware the potter places a lump of clay, as received from the pugging mill, on to a spreader, a revolving wheel on to which an arm descends and spreads out the clay to the required shape for him to use on the adjacent jollyer. On this machine, which is a form of potter's wheel, a profiled arm forms the spinning clay into the desired shape. Both the spreader and jollyer are driven by the same ¾ h.p. Brook "Cub"



In Mitchell continuous dryers the ware, on racks, steam-heated compartment and down the other

One of the sliphouses where the raw materials for the "slip" are mixed

is slowly passed vertically up one side of a tall ready for treatment on the fettling tables

motor, a clutch and cam mechanism causing the spreader wheel to rotate for a few seconds only when a lever is operated.

After moulding or shaping on the jollyer, the ware spends several hours in a dryer. Considerable use is made of Mitchell continuous dryers in which the ware, on racks, is slowly passed vertically up one side of a tall steam-heated compartment and down the other for removal on the opposite side. Operating these dryers are ⅓ h.p. Higham motors with ½ h.p. Brook "Cub" motors to drive air-circulating fans. When the ware is hardened sufficiently to handle, it is fettled (cleaned up) by hand, the dust being removed by means of electrically driven extract fans, and is then ready for firing.

At present the first, or biscuit, firing is carried out in coal-fired bottle kilns, but it is probable that electrical methods will be employed here, too, before very long. The ware is packed in saggars, or earthenware containers, together with alumina powder, and spend about 55 hours in the kiln, which attains a maximum temperature of 1,320 deg. C. After inspection, the ware is sorted, dipped in glaze and dried in slightly heated storerooms. It then passes to a new Gibbons Bros. continuous tunnel glost oven, the installation of which has just been completed.

This oven, which is 126ft long, 7ft high and 6ft wide overall, accommodates twenty-five trucks, 4ft 6in long, 17½in wide and 4ft 4in high, each holding sixteen dozen pieces of ware. A special feature of the construction of the tunnel is that in the firing zone each wall has, in addition to 9in of brickwork, 18in of exfoliated or exploded mica packed within the sheet metal framework outside. Diatomaceous earth is used for the heat insulation of the preheating and cooling zones.

The oven is designed to fire at a maximum of 1,070 deg C with preheating zones at 650 deg C and 940 deg C. The cycle of operations from the entry of a truck into the tunnel until it emerges at the other end lasts 22 hours. Heating is by means of electric heating elements of the nickel-chrome type supported horizontally on "Sillimanite" formers. The elements, which are loaded at a minimum of 2.4 kW each, are fitted in eight of the 6ft long sections of which the oven is composed. In the section at the beginning of the preheating zone there are two elements each side, the succeeding sections containing four, six, six, nine, nine, twelve and twelve elements re-

The spreader and jollyer (shaping machine) are driven by the same motor

spectively, making in all sixty each side, or a total of 120.

Ninety-six of these elements are in circuit all the time, the remaining twenty-four which are thermostatically controlled being normally required only when starting up from cold. The elements are balanced over the three phases of a 415 V supply, the initial load of 175 A per phase being reduced to about 150 A as the temperature is built up. The oven will consume about a million kWh a year.

Temperatures at two points in the preheating zone and one in the firing zone are indicated, recorded and controlled by an Electroflo board, which also incorporates red and green pilot lamps to show when the main and auxiliary heating elements are in circuit. Brookhirst gear operated by the Electroflo equipment switches the auxiliary elements on and off through relays. An Ellison main circuit breaker is employed. Constant supply pressure is achieved by the use of a "Breco" automatic voltage regulator.

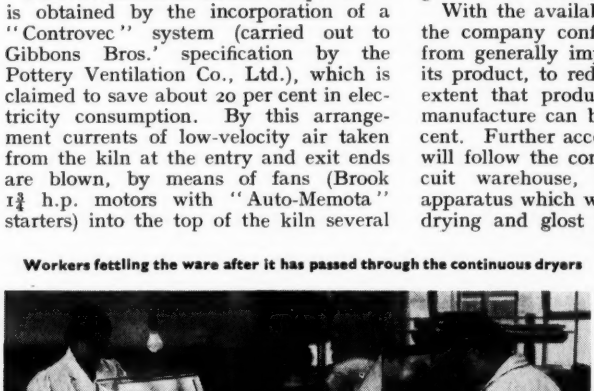
Further control of the kiln temperatures is obtained by the incorporation of a "Controvec" system (carried out to Gibbons Bros.' specification by the Pottery Ventilation Co., Ltd.), which is claimed to save about 20 per cent in electricity consumption. By this arrangement currents of low-velocity air taken from the kiln at the entry and exit ends are blown, by means of fans (Brook 1¾ h.p. motors with "Auto-Memota" starters) into the top of the kiln several feet away towards the firing zone, the air flow being regulated by means of dampers inserted in the ducts.

This scheme very effectively counteracts the flow of hot-air currents which, in tunnel kilns, tend to flow from the hot zone to the end zones and cause unnecessary heat loss, besides retarding the cooling of the ware. Provision is made for adjustments to be made to cover changes in atmospheric conditions, while to remove any impurities in the air, easily cleaned filters are incorporated in the ducts. To keep the temperature of the room containing the oven at a comfortable level in hot weather G.E.C. extract fans (16 h.p.) have been fitted over the firing zone and in an outside wall.

The pushing gear for propelling the trucks through the oven is driven through gearing by means of a 1 h.p. 1,420 r.p.m. Crompton Parkinson motor, traversing gear being provided at both ends of the oven. Gent bells ring when it is time for the truck to be removed, and if for any reason this is not done the pushing gear is automatically cut off.

With the availability of this new oven the company confidently expects, apart from generally improving the quality of its product, to reduce rejects to such an extent that production at this stage of manufacture can be increased by 50 per cent. Further acceleration of production will follow the completion of a new biscuit warehouse, dipping and drying apparatus which will enable the dipping, drying and glost firing processes to be carried out as a continuous operation.

Workers fettling the ware after it has passed through the continuous dryers



Decoration of the china, which is carried out by hand, transfer or ground laying process, is done either before or after glazing, according to the needs of the colour medium employed. If it is done after glazing a further firing is required in an enamelling kiln of basically similar design to the glost oven just described, but having a loading of only 50

kW and working at maximum temperatures of 760-780 deg C according to the colours used. This kiln is 70ft long and holds fourteen trucks.

One more electrical operation, undertaken before the finished china receives its final inspection and is packed for dispatch, is polishing, for which wheels driven by 1 h.p. 1,420 r.p.m. Brook motors are employed. As in previous operations an extract system takes away any dust.

Most of the electrical installation work in the factory has been carried out by Messrs. Willdays, Derby.

Dusting on colour in the ground laying department of the Crown Derby factory

We should like to thank Mr. Philip Robinson, managing director of the company, and Mr. Colin F. Osborn, sales manager, for their help in preparing this article.

Evolution of the Lamp Industry

AN American book just published in this country* contains a mass of data relating to the electric lamp industry from its genesis to the present day. The approach is partly historical—nearly half of the work is occupied with historical notes; while any student of the growth of the industry will find it packed with information of a statistical nature, comments on patent developments and references to judgments of the U.S. Courts.

It is not surprising that the writer, with ready access to American material, should concentrate on the American market and give prominence to American achievements. These achievements are admittedly of the greatest possible importance, but it is a pity that the bibliography contains no up-to-date references to British developments. If the author had had knowledge of them he certainly could not have written:—

> "Until about 1935, Europe continued to make major contributions. Since then the scientific leadership in discharge lighting has been shifting to this country."

In fact, of course, Great Britain has and is making major contributions in this field.

Mr. Bright is on much surer ground when referring to the outstanding engineering development, promotion, and market development, low cost, high quality production and enthusiastic consumer acceptance of new products.

The author has succeeded in writing a painstaking study of great interest to executives in the lamp industry. The conclusions at times seem to be theoretical and opinions are insufficiently supported by fact; indeed a thoughtful reader with practical knowledge of the subject could arrive at sane opposite conclusions.

One thing stands out supreme—that the electric lamp industry in the United States has tremendous technical and commercial achievements to its credit and the public has benefited by having high quality lamps at reasonable cost. If other industries could show as good performance mankind would be the better for it.—W. J. J.

* The Electric Lamp Industry. By Arthur A. Bright, Jr. (pp. 526; 43 illustrations). Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2. Price 37s 6d in the U.K.

Melbourne Tramway Board. — Although traffic receipts for the financial year ended 30th June, 1949, were at £4,030,346, final results showed a deficit of £226,990.

Views on the News

By REFLECTOR

HOW many of my readers would be able to state the weight of a power station chimney? The one at Stepney power station is 350ft high with an external diameter at the top of 25ft. It is the tallest in London but has overtopping rivals elsewhere in the country. I have it on the authority of *London Generation* (magazine of the B.E.A. London Division) that the chimney's weight is 5,200 tons and that it is mounted on a 6ft thick concrete slab representing another 1,300 tons.

★ ★ ★

Mention was made in the November *Electrical Contractor* of the appearance of black spots in an aluminium electric kettle with corresponding lumps on the exterior. In the December issue it is suggested that the spots are caused by minute amounts of copper which will attack aluminium kettles whether electric or otherwise. The copper is suspected to come from hot water systems employing copper pipes and one correspondent says that he has known a kettle of good make to "go" in six months under these conditions. Another writer says that the action is intensified where the copper pipes are used for earthing. His advice is that kettles should never be left standing with water in them.

★ ★ ★

I have often thought that greater use might be made of electrically operated doors, and it therefore pleased me to notice during a recent visit to the works of Brook Motors, Ltd., at Huddersfield, that all the sliding doors between the various sections of the factory now open and close in response to pushbuttons. This must save a very considerable amount of manual effort, for some of the doors are no light weight and have to be opened and shut innumerable times during the course of the day. Fractional horse-power motors—of the the company's own manufacture of course— are employed to operate the doors. They drive through gear reduction units, limit switches being fitted at each end of the run. By a coincidence, almost the next factory I visited, that of Birkby's, Ltd., at Liversedge, has a variation of the same idea. In the entrance hall there, the receptionist, who also operates the telephone switchboard, is enabled by electrical means to open and close the glass window of her office without having to get up. The addition of photo-electric cells to render this and similar operations entirely automatic is the next step.

★ ★ ★

I have seen several letters in newspapers commenting on the apparent contradiction in current advertising by the B.E.A. and Electricity Boards. The writers want to know how it is that some advertisements call for strict economy while others are designed to encourage the use of electricity. The fact that the announcements relate to different times of the day doesn't always penetrate the public mind. Hence it was necessary for the chairman of the South Western Electricity Consultative Council to reply to letters of this kind in the *Western Morning News*. But was it also necessary for the South Western Board's information officer to explain as well, in similar terms? I have always feared that the Consultative Council arrangement would lead to overlapping. I do not consider that the Councils' function is to act as apologists for the Boards; they are supposed to be the public's watchdogs, and watchdogs should growl or bite when necessary.

★ ★ ★

Electricity consumers frequently complain that they have to continue to pay hire charges for cookers when they have already paid more than the original cost. No doubt it seems unfair that the charges should go on long after the appliances have been written off, but what consumer renting a house expects to be presented with it after, say, twenty years?

★ ★ ★

The *Yorkshire Post* mentions a new device, an attachment to be fitted to a water tap. "Two electrode plates heat the water as it passes through, and they use little current. This device gives one pint of boiling water a minute." Neither from the speed nor the safety aspects would I fit this in my bathroom.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

"This Earthing Fetish"

THE extent to which you have opened your columns to correspondents on this subject reflects the degree of importance you attach to a practical solution. It is clear from the letters which have been published that the answer has not been given and that the system of protection to be adopted will require to be adjusted to particular circumstances.

It would seem that the earth-leakage circuit-breaker will be called upon as the means of protection when a low-resistance earth electrode is not readily or easily available. The popularity of the immersion heater has created difficulty in assuring protection from this device when it is connected to the earth circuit. In cases in which the heater has been isolated from the earth circuit, shocks from taps, etc., have been experienced.

I should be interested in readers' views on this problem and to learn of methods adopted to eliminate the undesirable symptom to which I have referred.

Crewe. H. NEVILLE.

Flat Earth and Farnham Royal

BOTH flat earthists and the Farnham Royalites who decided recently not to introduce electrical road lighting in their village will probably be rather annoyed by "Reflector's" remarks in the *Electrical Review* of 2nd December. I think it is hardly fair to class them together, because the decision to ban road lighting may be based on quite rational and aesthetic grounds, which cannot be said for the decision to ban the curvature of the earth.

One important effect of road lighting in a small town or village is the obscuring of the night sky. The inhabitants of London, or any other large town, rarely see the sky as a countryman sees it; in fact at night their perspective is confined to a few hundred yards, and even that distance is usually crammed with large and strident posters. Worst of all, is the effect of mercury vapour street lighting, which turns everyone—old or young, ugly or beautiful, ill or healthy—into cold, corpselike creatures with pale green faces and purple lips. Far, far better to have no lighting than this.

If the argument for street lighting is that it prevents accidents, let the people of Farnham Royal spend their money instead on good pavements with lights only at road crossings. And if they have them already, or have any money left over, I hope they will patronize the electrical industry and buy a few electric washing machines and a radio set for a communal laundry. Judged as a contribution to happier living, this would be much more worth while than a string of bright lights.

"SAVOIR VIVRE."

Sales Engineers

"SURPRISED" has expressed his views as a buyer, and "Director" his views as an employer. Both, I think, have some justification, but I also think it is quite wrong to express such a general opinion.

As a sales engineer I take great pride in knowing my product from a technical aspect in order not only to create the desire to buy in the people I call upon, but also to act as adviser on the equipment I deal in. I think that "Surprised" has been rather unfortunate, and he has my sympathy. I wholly disagree with "Director" in his statement that most men want safe and low-paid jobs with the security of superannuation. There are plenty of men about with drive, initiative and spirit of adventure, ready to go anywhere and pioneer markets, provided the prospect of earnings are commensurate with efforts.

The trouble with most advertisers for technical sales engineers is the ridiculous age limits usually stated. Often these are given as between 25-40 years maximum. Do such advertisers limit the useful business life of man to only 15 years? Reflection on the ages of most high executives in all phases of life soon proves how wrong

the age limit implication is. Given good health, there is no age limit applicable to the right type of man with the ability and experience. If "Director's" company offers a position in which £3,000 per year can be earned, he will find the type of man if he looks above 40 years of age.

SALES ENGINEER.

YOUR correspondent "Director" certainly offers a unique opportunity, for how many electrical manufacturing firms will pay £3,000 per annum to their technical salesmen?

After receiving a public school education and serving an excellent apprenticeship with a well-known company, I and several of my colleagues, who have been employed from 15 to 20 years on the technical sales staff, are receiving the princely sum of from £550 to £650 per annum. This state of affairs I believe to be general among the larger concerns.

It is no wonder, then, that your other correspondent "Surprised" is visited by "contact men," as, obviously, the prospects on the sales side are not good enough to attract the right type of individual.

"QUALIFIED."

"DIRECTOR" in his comments on "Surprised's" letter of 18th Nov., 1949, states that "each to his effort" is what this country needs. I wholeheartedly agree with him, as I also agree that the spirit of adventure, and, most certainly, the spirit of initiative, has died out. But what is the return for "each to his effort" of those of us who *do* give of our best, and thoroughly understand our job and that "little bit more?"

We have returned from the war ready and willing to battle on our old "front" again, with what result? Frustration at every turn, and, especially here in the North where the object is to pay as little as possible for as much as a man can do.

"Director" says he will be surprised if his firm receives capable and enthusiastic replies to its call for a technical sales engineer. So will I, if the general experience is like mine—plenty of applications sent but so few replies, not even the courtesy of a reply through the free channels of this very journal.

The spirit of adventure and initiative is as much missing from the employers' side as from ours. They will not give a good man a good chance and a good return for his services, so ensuring capable representation and good will all round.

"SEMPER PARATUS."

IT seems that your correspondent "Director" is looking for a successful sales engineer to whom he is prepared to pay £3,000 per annum. I am a successful sales engineer seeking a director willing to pay me £3,000 per annum. We should obviously be in touch to our mutual advantage. Perhaps we would have been if some indication of remuneration had been given in the advertisement concerned.

However, there may yet be hope for both sides, and if "Director" is really interested you have my permission to convey to him my name and address.

"SALES ENGINEER."

BEING a "Sales Engineer" in the North-West, I have been very interested in the recent correspondence.

I joined my firm on leaving school. I had the privilege of passing through the engineering shops, maintenance, drawing office, pattern shop, etc., after which time I served several years outside, working on installation and service. I became installation and service superintendent, a position which I held until I moved into this area three years ago. I am 33 years of age.

As a long-term policy, no doubt my firm derives advantage from its method of training suitable men. Perhaps if "Director" cultivated his engineers from the "rank and file" he would be able to put on the road men who had had a sound training and also confidence in the products they are selling.

"AREA REP."

[We have received other letters on this subject, but those published are typical examples.—EDITORS, *Electrical Review*.]

Trade with Japan

Recently a new trading arrangement between occupied Japan and certain sterling area countries was announced. It provides for a sterling balance in favour of Japan for the year ending next June.

Among the goods which the sterling area countries will purchase from Japan are unspecified electrical products.

Personal and Social

NEWS OF MEN AND WOMEN OF THE INDUSTRY

THE Royal Society has awarded a Royal Medal to **Sir George Paget Thomson** for his distinguished contributions to atomic physics and especially for his investigation of the wave properties of the electron. The Hughes Medal is awarded to **Professor Cecil F. Powell** for his distinguished work in physics and particularly for the discovery of mesons and their transformations.

In our last issue we reported the appointment on 1st November of **Mr. C. W. Stoodley** as general works manager of the Hotpoint Electric Appliance Co., Ltd.; and the consequent changes in personnel at the Rugby Works of the British Thomson-Houston Co., Ltd.

Mr. Stoodley, who was general superintendent of the B.T.H. Rugby Works and sub-factories, served his apprenticeship with Laurence, Scott and Electromotors, and subsequently specialized in the design, manufacture and servicing of tools with several well-known engineering concerns in this country and overseas. In 1932 he joined the B.T.H. Co., Rugby, as operation planner, and in recent years has been closely identified with Celta Mills, the factory at Peterborough, first during the war period from 1939 to 1945, when he was general superintendent of the B.T.H. airframe factories and tool and press departments; and from 1945 until the present time as general superintendent of the B.T.H. Rugby Works and sub-factories, during which time Celta Mills was extended and equipped for the manufacture of B.T.H. and Hotpoint domestic appliances.

Mr. C. W. Stoodley

Mr. H. Dreghorn

Mr. B. E. Pedler

Mr. L. Sayles

Mr. H. Dreghorn, B.Sc., who succeeds Mr. Stoodley as general superintendent at Rugby, graduated in electrical engineering with distinction at Glasgow University, before serving an apprenticeship with Andrew Barclay, Sons & Co., locomotive and mining engineers, Kilmarnock. He joined the B.T.H. Co. in 1915 as test engineer, and in 1919 transferred to the engineering department, where he was concerned with the design of a.c. commutator motors. Transferring in 1928 to the production side, Mr. Dreghorn spent several years as superintendent of the motor factory, and others. In 1940 he was appointed planning engineer. He has presented many papers on a.c. commutator motors, refrigerators, and domestic appliances, and production planning to universities and technical societies. Mr. Dreghorn was chairman of the Midland Branch of the Institution of Works Management from 1945-1947 and has been a member of the Council of that Institution since 1947.

Mr. B. E. Pedler, who becomes planning engineer at Rugby, received his early education at the King Edward VI School, Aston, Birmingham, and his technical training at the Rugby College of Technology and Arts. He joined B.T.H., Rugby, in 1924 as an engineering apprentice, and subsequently gained a varied experience in the construction department. Among the machines with which he was associated in connection with erection and commissioning were the first two 75,000 kW turbo-alternators at Barking generating station, the 30,000 kW turbo-alternator at Ford's, Dagenham, and two 50,000 kW turbo-

alternators at the Ironbridge Power Station. After four years as maintenance engineer at the Orb Ironworks of John Lysaght, Ltd., Mr. Pedler returned to the B.T.H. Rugby Works in 1947 as works plant engineer.

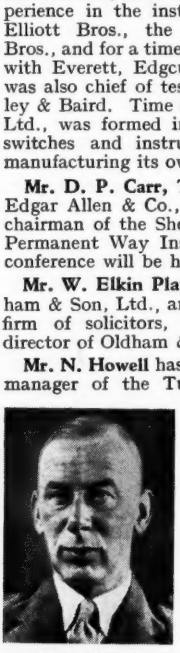
Mr. L. Sayles has been appointed works plant engineer. He served an apprenticeship with Hopkinsons, Ltd., Huddersfield, and obtained further practical engineering experience with other firms, including James Tate & Co., Bradford, before joining the B.T.H. Co., Rugby, in 1929 as draughtsman in the turbine drawing office. He transferred to the planning department drawing office in 1931, becoming head in 1934, which position he vacated in 1948 to become head of the factory equipment section of the planning department.

Mr. L. A. Marshall has been appointed London representative of Time Switches & Instruments, Ltd. Mr. Marshall gained experience in the instrument departments of Elliott Bros., the G.P.O. and Gambrell Bros., and for a time was senior test assistant with Everett, Edgcumbe & Co., Ltd., and was also chief of test with Kelvin, Bottomley & Baird. Time Switches & Instruments, Ltd., was formed in 1932 to import timeswitches and instruments, but it is now manufacturing its own products.

Mr. D. P. Carr, Trackwork Department, Edgar Allen & Co., Ltd., has been elected chairman of the Sheffield Committee of the Permanent Way Institution, whose annual conference will be held in Sheffield in 1950.

Mr. W. Elkin Platt, legal adviser to Oldham & Son, Ltd., and head of a Manchester firm of solicitors, has been appointed a director of Oldham & Son.

Mr. N. Howell has been appointed general manager of the Tudor Accumulator Co., Ltd., following the recent retirement of **Mr. P. Cattermull,** F.C.I.S. Mr. Howell, who is forty-four, has been associated with the battery industry all his life. His first post after qualifying as a works chemist at the Manchester College of Technology, of which he is an associate, was on the technical and laboratory staff of the Chloride Electrical Storage Co., Ltd., where he gained a wide experience in the whole field of battery manufacture. During the war Mr. Howell was appointed works manager of a Ministry of Supply factory in Belfast where signal batteries for the Services were made. In November, 1945, he joined the Tudor Accumulator Co. as works manager and worked in close collaboration with Mr. Cattermull until the latter's retirement.



Mr. N. Howell

E. K. Cole, Ltd., announce that **Mr. G. R. J. Harris** has joined the publicity department at Southend as press relations officer. Mr. Harris was until recently information officer to Radio & Television Trust, Ltd., and before that, advertising manager of Philco Radio & Television Corporation of Gt. Britain, Ltd. He has been associated with radio, lighting and electrical publicity since 1930, when he joined the Philips organization. Mr. Harris became publicity manager of R.C.A. Photophone, Ltd., in 1934, and of the Mullard Wireless Service Co., Ltd., in 1936.

Mr. G. R. J. Harris

The overseas manager of Parnall (Yate), Ltd., is **Mr. G. H. Rosam** not Posam as stated in our last issue.

The Midlands Electricity Board announces the resignation of **Mr. G. D. Johnstone,** A.C.A., Companion I.E.E., M.I.I.A., who has since vesting day acted as manager, Central Gloucestershire Sub-Area. Before the nationalization of the supply industry, Mr. Johnstone was general manager of the West Gloucestershire Power Co., Ltd., the Chepstow Electric Lighting and Power Co., Ltd., and the Thornbury Electric Lighting and Power Co., Ltd. He is vice-president of the Gloucester & County Chamber of Commerce. Mr. Johnstone states he has resigned his appointment at his own wish so that he may develop a professional career as a chartered accountant with the practice of Robertson, Hill & Co., London, Gloucester and Cheltenham, in which firm he has taken up a partnership. He also proposes to take up farming. Mr. Johnstone's resignation is effective as from 31st December next.

Mr. L. Hotine, senior superintendent engineer, is leaving the B.B.C. after more than twenty-six years' service. He joined the Corporation in 1923 as engineer-in-charge of the Glasgow station and was successively engineer-in-charge at Daventry and Brookmans Park. He then joined the head office staff as superintendent engineer, transmitters, and continued in that post until 1943 when he was appointed senior superintendent engineer.

Mr. J. H. Appleby, of the Suffolk Sub-Area, Eastern Electricity Board, has been appointed chief engineer (elcctricity) to the

Public Works Department of the West Punjab Government, Pakistan. He received his technical training as a student with W. H. Allen, Sons & Co., Ltd., and served for a period at sea as engineer in the Bibby Line. In 1926 he joined the Letchworth electricity undertaking, with which he later became distribution superintendent and mains superintendent. He was appointed deputy borough electrical engineer at Colchester in 1944, which position he held until vesting date, when he was appointed deputy to the district manager (the former borough electrical engineer). Mr. Appleby sails on the s.s. *Strathaird* on 22nd December.

Mr. **J. J. Thompson** and **Mr. B. H. Killinger** have been appointed executive directors of Berry's Electric, Ltd. Mr. Thompson is sales manager and Mr. Killinger manager of the company's Wembley Works.

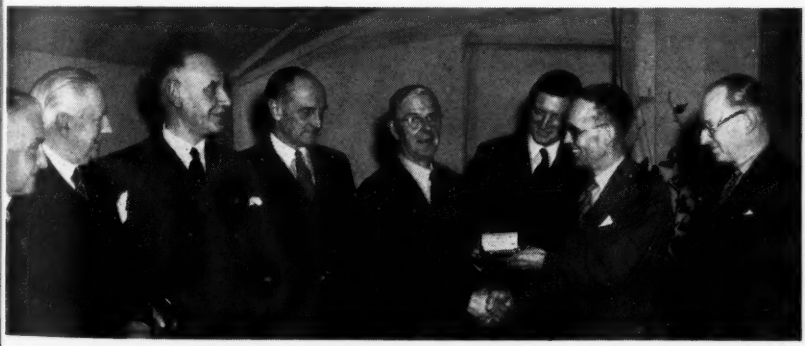
The British Central Electrical Co., Ltd., announces that **Mr. S. W. Crockford** joined them on 5th December to take charge of its Plant and Estimating Department.

Mr. W. P. Philpott, executive officer of the Yeovil District, Southern Electricity Board, since nationalization, has retired after forty-five years' service in the electricity supply industry, and will now reside at Bournemouth. Before nationalization he held the position of Yeovil district manager, Wessex Electricity Co. Mr. Philpott joined the Dorking Electricity Supply Co. in 1904 and rose to be engineer and manager, which position he held in 1930 when appointed to Yeovil. At the Assembly Rooms, Yeovil, on 23rd November, Mr. Philpott was presented with a gold watch on behalf of the staff by Mr. M. Clissold, district manager, Yeovil. Amongst those present were Messrs. H. Nimmo, chairman of the Southern Electricity Board; R. R. B. Brown, deputy chairman; N. F. Gadsdon, Bournemouth Sub-Area manager; W. E. Brandreth, former manager of the old Wessex Electricity Co.; W. D. Fisher, Newbury Sub-Area engineer; and a number of former district managers of the old Wessex Electricity Co.

Mr. J. P. Jeffcock, O.B.E., M.I.E.E., F.R.Ae.S., who until recently was Director General of Civil Aviation, Government of Pakistan, has joined Mullard Electronic Products, Ltd., as commercial manager of their Equipment Division. He has also been appointed a director of Mullard Equipment, Ltd. Mr. Jeffcock, who is thirty-nine, was educated at Lancing College and studied electrical engineering at the City and Guilds College, London. From 1929 to 1936 he was with the Western Electric Co., Ltd., engaged in the design of talking picture equipment. Joining the Air Ministry in 1936 and the Ministry of Aircraft Production in 1941, he played a prominent part in the development of aeronautical communications and radar.

Mr. J. P. Jeffcock

After the war he became first Director of Communications for Civil Aviation in India, on loan to the Government of India from the Ministry of Civil Aviation. In 1947 he



Presentation to Mr. W. P. Philpott

(Left to right): Messrs W. E. Brandreth (late general manager, Wessex Electricity Co.); W. D. Fisher (Newbury Sub-Area engineer); N. F. Gadsdon (Bournemouth Sub-Area manager); H. Nimmo (chairman, Southern Electricity Board); W. P. Philpott (district executive officer, Yeovil); R. R. B. Brown (deputy chairman, Southern Electricity Board); M. Clissold (district manager, Yeovil); and V. C. Botham (mains engineer, Yeovil)

was promoted to Deputy Director General of Civil Aviation in India and, on partition of that country, became Director General of Civil Aviation in Pakistan.

Mr. C. Nicol, A.M.I.E.E., assistant meter and test superintendent in the Glasgow Sub-Area of the South West Scotland Electricity Board, retired on 3rd December, and at a recent function received a wallet of notes from the staff of the Sub-Area and friends. Mr. A. Kelso, Sub-Area manager, made the presentation. Mr. Nicol commenced his apprenticeship with Kelvin and James White, Ltd., in 1901, and served with that company until 1908 when he joined the Greenock Corporation Electricity Department, which was amalgamated with Glasgow Corporation in 1912, and he continued in the service of the Glasgow Corporation until vesting date.

The annual ball of the Manchester Branch of the **Electrical Industries Benevolent Association** was held recently at the Midland Hotel, Manchester, and proved a great success. A number of photographs were taken during the evening, one of which we reproduce herewith.

(Left to right): Messrs. R. H. Cobden Turner (chairman), A. H. Owen (Branch secretary), and H. Senior Fothergill (national secretary) at the E.I.B.A. Manchester Branch Ball

Mr. H. Carpenter, A.M.I.E.E., domestic and commercial development engineer, No. 4 Sub-Area, North Western Electricity Board, has been appointed autumn illuminations and public street lighting officer to the Blackpool Corporation at a salary of £1,500 to £1,650 per annum. Mr. Carpenter was formerly chief electrical engineer to the Thornton Cleveleys U.D.C. During the last war he was released from his duties to take up the post of temporary experimental officer with the Admiralty, being attached to the staff of the Superintendent of Degaussing until 1942, after which he was on the staff of the Superintendent of Mine Design.

Mr. H. West, M.I.E.E., M.I.Mech.E., has been appointed assistant chief electrical engineer of the Metropolitan - Vickers Electrical Co., Ltd. Mr. West was one of the earliest apprentices at Trafford Park to be awarded a company's scholarship which took him to the Manchester College of Technology where he studied electrical machine design under Professor Miles Walker. After a short period in the M.V. Research Department he joined the Motor Engineering Department, for which he had been specially selected to undertake development work, eventually becoming chief engineer, Motor and Welding Departments. Since 1935 Mr. West has served on a large number of Committees of the B.S.I., E.R.A. and B.W.R.A. and has travelled extensively on behalf of M.V. in Europe and America.

Mr. H. West

Obituary

Lord Pender, whose death occurred on 4th December at the age of sixty-seven, was a leading figure in telegraphic communications, and was formerly governor and managing director of Cable & Wireless, Ltd., and chairman or a director of a number of cable, telegraph and other companies. He was the eldest son of the late Sir John Denison-Pender, and grandson of Sir John Pender, a pioneer of submarine telegraphy.

Mr. C. F. Mounsdon.—The death occurred on 2nd December, at the age of sixty-five, of Mr. Cecil Frederick Mounsdon, M.I.E.E., former area manager, East Kent, of the Sevenoaks & District Electricity Co., Ltd. He was at one time a member of the Council of the Overhead Lines Association, and of the Committees of the Transmission and Informal Meetings Sections of the I.E.E.

The Earl of Verulam, whose death as the result of a car accident we briefly recorded in our last issue, received his education at Eton and Oxford, and decided to make engineering his profession. He specialized in electric cable manufacture, and became chairman of Enfield Cables, Ltd., and Enfield Rolling Mills, Ltd. He was also at one time on the board of Associated Electrical Industries, Ltd. He is succeeded in the title by the elder of two surviving sons, Lord Forrester, who is managing director of Enfield Cables, Ltd.

Economy Loading of Generating Plant

Foundation on which to Build Up Load Dispatching Systems

By G. OLDROYD*
A.M.I.E.E., A.M.Inst.F.

MANY attempts have been made to find a method whereby a total load can be allocated between individual generating sets, on a large supply system, so that maximum overall economy of operation will result at all load levels. The most favoured system in this country has been the principle of "base loading to maximum capacity rating," largely due to the simplicity with which it can be handled. On this basis the most economical machine at m.c.r., is first loaded to capacity, then the next best and so on, load being reduced in the reverse order. It is realized that the best economy of operation has not resulted from this method, as all generating plant is obviously not most economical when running at m.c.r.

In order to improve on the m.c.r. loading method, base loading to the most economic rating was occasionally tried. This depends on loading the most economical set at e.r. to that rating, followed by the next best and so on, load being increased to m.c.r. in the same order. Analysis of this system shows that the most economical load allocation is not achieved at all load levels and, like the m.c.r. method, the system is the result of thinking in terms of individual machine economies rather than in terms of the economy of combined operation.

Attempts at a complete solution have usually been based on the direct use of the turbine, or overall turbine and boiler plant, input/output characteristics in the form of "Willans" or "Parsons" lines. Any method which employs input/output characteristics directly involves the participant in the calculation of every possible machine combination for every possible load, in order to select the correct combination for each load level. On a large system with a rapidly fluctuating load this is obviously out of the question.

Machines have been designed to perform the necessary calculations, leaving the operator free to make his selection of the most economical combination. In practice such machines are usually unsatisfactory, as unless the operator tries every possible combination for a given load he can never be sure that he has the right one. It may be added that the possible plant combinations for one load level on a large system could run into hundreds of thousands. A machine to make all these calculations and deliver the right answer quickly and automatically would have to be of the nature of an "electronic brain."

It has been suggested that a trained operator with a rough knowledge of the relative economies of individual machines might be able to limit his selection by trying only a few combinations which he considered the most probable. It is extremely doubtful if such a "cut and try" process would warrant the construction of anything but the most simple machine and even then it is unlikely that the results obtained would be superior to those of either previous method.

Theory of Incremental Rates

Thus attempts to solve the problems involved by the direct use of input/output characteristics are generally foredoomed to failure unless special elaborate and costly calculating devices are employed.

The problem is, however, basically amenable to a simple solution and one does in fact exist in the "theory of incremental rates" which states that: "When certain machines have been selected and paralleled with a common load, the individual machine outputs, for minimum combined input, are given when the individual machines are operating at loads corresponding to equal incremental rates."

* Assistant efficiency and test engineer, East Midlands Division, B.E.A.

TABLE I.
M.c.r. Merit Order.

Machine	M.c.r. MW	M.c.r. cost d/kWh.
A	30	0.280
B	50	0.298

The term "incremental rate" is defined as the rate of change of input with respect to output. The incremental rate curve of a machine is, therefore, the first derivate of the input/output curve. In the case of power station plant, incremental rates can best be established as constant values between turbine valve points, i.e., the input/output characteristics can be closely approximated by straight lines between turbine valve points.

Fig. 1 shows that the turbines involved have two steam supply valves on each machine, a main throttle valve and a by-pass valve which admits steam at stages lower down the turbine when the load reaches a certain level, in this case 24 MW on "A" machine and 40 MW on "B" machine.

Proof of the incremental rate theorem for any two machines in parallel operation is as follows: For any given value of combined output it is required to find the conditions under which the individual machine outputs are such that the combined input is always the minimum. Let I_T = combined input of the two machines, I_1 and I_2 = individual machine inputs, L_1 and L_2 = individual machine outputs and L_T = combined output.

I_T is the minimum when its first derivative with respect to L_1 becomes zero; that is:—

$$\frac{d\,I_T}{d\,L_1} = 0 \quad .. \quad .. \quad .. \quad (1)$$

$$I_T = I_1 + I_2 \quad .. \quad .. \quad (2)$$

and $$L_T = L_1 + L_2 \quad .. \quad .. \quad (3)$$

Therefore $$\frac{d\,I_T}{d\,L_1} = \frac{dI_1}{dL_1} + \frac{dI_2}{dL_1} = 0 \quad .. \quad (4)$$

Then $$\frac{d\,I_1}{d\,L_1} = -\frac{dI_2}{dL_1} \quad .. \quad .. \quad (5)$$

But $$\frac{d\,I_2}{d\,L_1} = \frac{dI_2}{dL_2} \times \frac{dL_2}{dL_1} \quad .. \quad (6)$$

From (3) $$\frac{d\,L_2}{d\,L_1} = \frac{dL_T}{dL_1} - \frac{dL_1}{dL_1} \quad .. \quad (7)$$

But L_T is constant for any one load, therefore:—

$$\frac{d\,L_2}{d\,L_1} = -1 \quad .. \quad .. \quad (8)$$

Substituting in (6) $$\frac{d\,I_2}{d\,L_1} = -\frac{dI_2}{dL_2} \quad .. \quad (9)$$

Substitute in (5) $$\frac{d\,I_1}{d\,L_1} = \frac{dI_2}{dL_2} \quad .. \quad (10)$$

From (10) it is seen that each side of the equation is, by definition, the incremental rate of the respective machine. Therefore from the original assumption in (1) the conclusion drawn from (10) is that minimum combined input results when the two machines operate at equal incremental rates. This conclusion is valid for any number of machines.

In the case of the machines related to Fig. 3, the incremental rates are represented by a series of discontinuous horizontal straight lines, the extremities being joined merely to indicate that the two sections belong to the same machine. As the incremental rate curves are discontinuous, it is not possible to divide the load between them on the basis of equal incremental rates. This type of curve, however, considerably simplifies the problem, as it now only becomes necessary to load the machines in merit order on their incremental rates, i.e., the machine with the lowest initial incremental rate takes all the load to the limit of that incremental rate range, then the next lowest machine and so on, load being reduced in the reverse order.

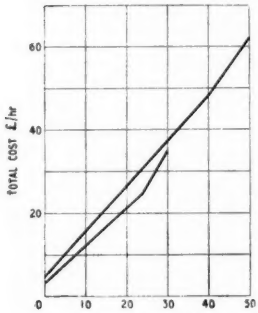


Fig. 1.—Turbine cost characteristics. Lower curve, Machine "A"; upper curve, Machine "B"

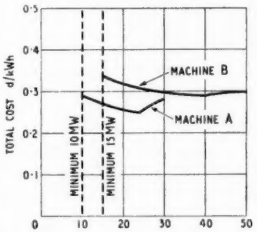


Fig. 2.—Turbine cost rates

Comparison of these incremental rate curves with the cost rate curves (Fig. 2) indicates the two methods of loading the machines. On a rapidly rising load, when both machines must be running in order to be warmed up for rapid load pick up, Fig. 2 curves indicate that machine "B" should be held at minimum load, warming up, until machine "A" has been fully loaded to its m.c.r. of 30 MW. Loading of machine "B" should now commence and continue until it is fully loaded to 50 MW. The curves of Fig. 3 immediately show that if the machines are loaded on the incremental rate principle the above method is incorrect, and machine "A" should first be loaded to 24 MW holding machine "B" at minimum load and, as load increases, machine "B" should be loaded fully to m.c.r. of 50 MW followed finally by machine "A" being loaded to 30 MW.

It must be emphasized here that an incremental rate schedule, as shown in Table II, gives no indication whatever of the sequence of adding to, or taking machines off, load. This must first be decided by inspection of the cost rate curves of Fig. 2 which show that, when loads are stable and are not liable to exceed the capacity of one machine, machine "A" should run in preference to machine "B." If the load exceeds the capacity of machine "A" the Tables show that it is preferable to run both machines loaded on the incremental rate principle, rather than run machine "B" alone, *e.g.*, at a total load of 40 MW the total cost/hr of machine "B" by itself is £48. Running two machines incrementally loaded, *i.e.*, from Table III, 16 MW on "B" and 24 MW on "A," the combined cost is £47.2, clearly indicating that two machines should be in operation.

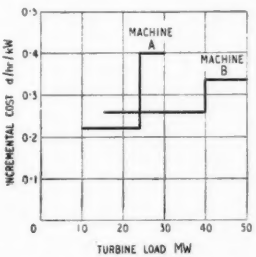


Fig. 3.—Turbine incremental cost rates of the two machines

Economy loading thus resolves itself into two entirely separate problems: (1) in what order shall machines be placed on, or taken off, load, and (2) when the order in (1) has been established, how shall the load be allocated between the running machines?

Problem (1) is solved from the cost curves as previously indicated and, when this has been done, one is at once com-

TABLE II.
Incremental Rate Merit Order.

Machine	Load range	Incremental cost rate.
	MW	d/hr./kW.
A	10–24	0.220
B	15–40	0.258
B	40–50	0.336
A	24–30	0.400

TABLE III.
Base Loading to M.c.r.

1	2	3	4	5	6	7	8	9
MACHINE "A"			MACHINE "B"			COMBINED		
Generation.	Total cost	Cost per kWh	Generation	Total cost	Cost per kWh	Total load	Total cost	Cost per kWh.
MW	£	d/kWh	MW	£	d/kWh.	MW	£	d/kWh.
10	12.2	0.292	15	21.2	0.338	25	33.4	0.321
15	16.8	0.269	15	21.2	0.338	30	38.0	0.304
20	21.4	0.257	15	21.2	0.338	35	42.6	0.292
25	26.7	0.256	15	21.2	0.338	40	47.9	0.287
30	35.0	0.280	15	21.2	0.338	45	56.2	0.300
30	35.0	0.280	20	26.5	0.313	50	61.5	0.295
30	35.0	0.280	25	31.8	0.306	55	66.8	0.291
30	35.0	0.280	30	37.3	0.298	60	72.3	0.289
30	35.0	0.280	34	41.6	0.293	64	76.6	0.287
30	35.0	0.280	35	42.7	0.293	65	77.7	0.287
30	35.0	0.280	40	48.0	0.288	70	83.0	0.285
30	35.0	0.280	45	55.0	0.294	75	90.0	0.288
30	35.0	0.280	50	62.0	0.298	80	97.0	0.291

TABLE IV.
Incremental Loading.

1	2	3	4	5	6	7	8	9
MACHINE "A"			MACHINE "B"			COMBINED		
Generation	Total Cost	Cost per kWh	Generation	Total cost	Cost per kWh	Generation	Total cost	Cost per kWh
MW	£	d/kWh	MW	£	d/kWh	MW	£	d/kWh
10	12.2	0.292	15	21.2	0.338	25	33.4	0.321
15	16.8	0.269	15	21.2	0.338	30	38.0	0.304
20	21.4	0.257	15	21.2	0.338	35	42.6	0.292
24	25.0	0.250	16	22.2	0.333	40	47.2	0.283
24	25.0	0.250	21	27.6	0.315	45	52.6	0.281
24	25.0	0.250	26	32.9	0.304	50	57.9	0.278
24	25.0	0.250	31	38.3	0.296	55	63.3	0.276
24	25.0	0.250	36	43.6	0.291	60	68.6	0.274
24	25.0	0.250	40	48.0	0.288	64	73.0	0.274
24	25.0	0.250	41	49.5	0.289	65	74.4	0.275
24	25.0	0.250	46	56.4	0.294	70	81.4	0.279
25	26.7	0.256	50	62.0	0.298	75	88.7	0.284
30	35.0	0.280	50	62.0	0.298	80	97.0	0.291

mitted to the no-load losses of the running machines ; consequently the incremental rates will then prevail in deciding the individual machine loadings.

Tables I and II show the m.c.r. and incremental rate merit order schedules respectively, while Tables III, IV and V give a comparison of the various loading methods described, the results being illustrated graphically in Fig. 4. The considerable improvement effected by the incremental method of loading is clearly shown. Base loading to e.r. has not been shown in Fig. 4 for the sake of clarity, as this method corresponds with the incremental method between the load range 25 MW to 64 MW and then becomes the same as the m.c.r. method from 64 MW to 80 MW. Base loading to e.r. shows up rather favourably in this particular example, but this is purely fortuitous and is by no means invariably the case.

The example quoted is intended to indicate the broad principles involved in incremental loading, and does not take into account the many added complications inherent in any large power system, such as the various combinations of turbine and boiler plant occasioned by outages of equipment, security and spare running, circuit limitations, etc., to name but a few. With these added complications load scheduling becomes a very complex problem and is far beyond the scope of a single individual equipped with a slide rule. The only satisfactory method of dealing with the multiplicity

TABLE V.
Base Loading to Economic Rating.

1	2	3	4	5	6	7	8	9
MACHINE "A"			MACHINE "B"			COMBINED		
Generation	Total cost	Cost per kWh	Generation	Total cost	Cost per kWh	Generation	Total cost	Cost per kWh
MW	£	d/kWh	MW	£	d/kWh	MW	£	d/kWh
10	12.2	0.292	15	21.2	0.338	25	33.4	0.321
15	16.8	0.269	15	21.2	0.338	30	38.0	0.304
20	21.4	0.257	15	21.2	0.338	35	42.6	0.292
24	25.0	0.250	16	22.2	0.333	40	47.2	0.283
24	25.0	0.250	21	27.6	0.315	45	52.6	0.281
24	25.0	0.250	26	32.9	0.304	50	57.9	0.278
24	25.0	0.250	31	38.3	0.296	55	63.3	0.276
24	25.0	0.250	36	43.6	0.291	60	68.6	0.274
24	25.0	0.250	40	48.0	0.288	64	73.0	0.274
25	26.7	0.256	40	48,0	0.288	65	74.7	0.276
30	35.0	0.280	40	48.0	0.288	70	83.0	0.285
30	35.0	0.280	45	55.0	0.294	75	90.0	0.288
30	35.0	0.280	50	62.0	0.298	80	97.0	0.291

of plant combinations and still be able to retain the basic principle of incremental loading with any degree of accuracy, depends on using punched card indexing methods as used in business accounting machines.

In conclusion it should be pointed out that the accuracy of any such system as the one envisaged depends entirely on the accuracy of the basic data for individual plant items; the first step towards the economy loading of generating plant therefore rests with the plant test engineers.

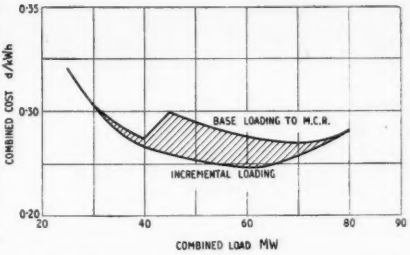


Fig. 4.—Comparison of m.c.r. and incremental cost rates showing the advantage of incremental loading

Uganda Board's First Report

CAPITAL COMMITMENTS OF £2 MILLION

IN fulfilment of the recommendations contained in the 1947 Survey by Mr. C. R. Westlake the Uganda Electricity Board came into being on 15th January, 1948. The first members were the Hon. H. S. Potter, S. S. Tindall, H. R. Fraser, C. Handley-Bird and A. N. Maini, with Mr. Westlake as chairman, and in August Sir John Kennedy joined the Board as London member. The undertakings at Entebbe, Jinja and Kampala were transferred to the Board from the East African Power & Lighting Co., Ltd., on 1st June of the same year, the purchase price being £364,112.

The Board's first annual report and accounts just published cover the period up to 31st December, 1948, at which date advances from the Government totalled £664,112. Outstanding commitments were estimated to amount to £2,000,000, as follows: four 21,000 h.p. turbines, £670,000; four 15,000 kW alternators, £535,000; ten 940 kW diesel alternators, £300,000 (balance); transformers, £140,000; steel, £213,000; housing and stores buildings, £51,000; switchgear, etc., £91,000.

Before the end of the year small sets were being installed in the new Kampala "B" station and work was commenced on the Jinja "B" station; these two plants were recommended as an interim measure to meet the load increment pending the completion of the first stage of the much larger Owen Falls hydro-electric project. A survey was made in the Mbale area and it was decided to erect a power station there scheduled for commissioning by the end of 1949.

At Owen Falls, following closer examination and numerous drillings, the site was altered to a much superior position a few hundred yards downstream and it was decided to construct the power station to house ten 15,000 kW sets; orders for four of these were placed in July, 1948. Negotiations were begun for the erection of a labour camp which it was estimated would be required to accommodate 2,000 men. Application was made to the Government for permission to build a cement factory in Tororo to provide supplies for the scheme.

A number of transmission and distribution extensions were approved by the Board during the year and a survey was in progress for a new 33 kV line between Kampala and Jinja.

The report, which is submitted by Mr. H. W. Povey, secretary and accountant, also records that the total number of consumers at the end of 1948 was 3,263, an increase of 262 since the date of transfer. The system m.d. reached 1,656 kW. Employees of the Board numbered 567 (40 Europeans) compared with 502 (10 Europeans) at 1st June. Work was commenced on the construction of three blocks of flats and fifteen quarters for Asian staff at Kampala.

Lighting Improvements

THE Leamington Spa Corporation is recommended to approve a scheme submitted by the borough engineer for the provision of mercury vapour discharge lighting for the Warwick Street to Portobello Bridge section of the borough, at an estimated cost of £2,150. It is proposed that the columns shall be Stanton concrete type and the lanterns G.E.C. "Dioptron" pattern.

Having tested three different types of street lighting in Arden Street and Guild Street, the Stratford-on-Avon Town Council has approved a recommendation that metal filament lighting shall be adopted.

NEW BOOKS

"Electrical Engineer" Reference Book. Edited by E. Molloy. Fourth edition. Pp. 2,168; figs. 2,250; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 50s.

Recent developments in electrical engineering have made necessary some considerable revision of many sections of this now standard reference book. In addition to the material formerly contained in 32 sections, the new edition gives particulars of the British Electricity Authority and of the 38 new power stations now under construction, including those regarded as extensions because of their close proximity to existing stations. The chapter on hydro-electric plants has been extended and deals with the subject generally as well as with the projects in the North of Scotland.

Other new matter relates to activities in the production of magnetic materials (including anisotropic ferrous alloys), superconductivity (elimination of ohmic resistance at critical low temperatures), semi-conductors and their applications, instant start fluorescent lamps, developments in wiring methods, servomechanisms (five pages), supervisory remote control and a.c. bridge measurements.

The section on "Progress," following the precedent set in each of the earlier editions, has been entirely rewritten. The information presented over so varied and wide a field as electrical engineering cannot, of course, be exhaustive, but the useful range of the work is extended by a 50-page bibliography listing books, Press articles and E.R.A. reports under 28 headings.—C. O. B.

Cold Cathode Fluorescent Lighting. By H. A. Miller. Pp. 130+viii; figs. 50; index. Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey. Price 10s 6d.

The author of this book has had considerable experience of the application of cold cathode fluorescent tubes to different lighting purposes, and in the later chapters he places at the disposal of the reader not only his own experience but that of other workers in the same field, both British and American. The two chapters dealing respectively with the manufacture of the tubes and with their operation are also valuable, though perhaps a trifle sketchy.

Unfortunately the first two chapters, purporting to give a general account of lighting principles and of the phenomena of the electric discharge through gases are, in contrast, more likely to mislead than to assist, since they abound with statements which the veriest tyro in illuminating engineering would condemn as incorrect. For instance, on one page we read that "a uniform point source of 1 lumen per square foot emits 4π (12.57) lumens," and that "for a perfectly diffusing luminous surface . . . the brightness in any direction . . . is commercially (*sic*) equal to the luminosity . . . divided by π."

Again, in Chapter II we find the astonishing remark that "radiant-heat, light, X-rays and all other electromagnetic disturbances were at one time assumed to have the same fundamental nature." The author is clearly out of his depth here, and these chapters might well have the effect of destroying the reader's confidence in the whole book. This would be unfortunate because in the other chapters, dealing with practice rather than theory, there is an assembly of much useful information which has hitherto been widely scattered in technical and trade literature.—J. W. T. W.

Books Received

Electricity in the Service of Man. By S. G. Starling. Revised by H. J. Gray. Second edition. Pp. 255; figs. 139; index. Longmans Green & Co., Ltd., 6-7, Clifford Street, London, W.1. Price 12s 6d.

Pottery and Ceramics. By Ernst Rosenthal. Pp. 304; figs. 23; index. Penguin Books, Ltd., Harmondsworth, Middlesex. Price 1s 6d.

National Insurance. By John Gazdar. Second edition. Pp. 96; index. Stevens & Sons, Ltd., 119-120, Chancery Lane, London, W.C.2. Price 4s.

Delivery Periods

Returning to Normal Conditions

By F. GEOFFREY MARSHALL
A.M.I.E.E.

NOW that the delivery periods quoted for new electrical accessories and components are fast approaching those which we were accustomed to expect in former days, the electrical engineer can afford to tighten up on his purchases and need only accept those articles which exactly cover his requirements.

Thus, he no longer has to accept large quantities of non-standard equipment, of a type that he does not like, for the purpose of finishing a job. This is a twofold advantage to the engineer. First, it is not necessary for him to waste a large proportion of his time hunting for material and, secondly, the resultant work has a satisfactory finished appearance. For instance, he no longer has to insert lengths of black enamel piping in a galvanized conduit system in order to complete the work.

Improvised Installations

During the war years, and later during the post-war period, when the acute scarcity of many key materials was so evident, we were all forced to depart from our long-cherished high standards of installation in order to keep the wheels of industry turning or, possibly, to bring into operation new plant by a scheduled date. We all hoped that with the end of the war this "make-do" period would come to an end, but events proved otherwise, and the connections established on a temporary basis, which were intended to last for only a few months, have in fact been in use with all their obvious blemishes and weaknesses uncorrected for several years.

In addition, many of our reconstruction programmes during the last year or two have had to be carried out with whatever types and class of material that we could obtain, rather than with that which we would prefer to use.

However, except in the case of large equipment, the position has now eased to such an extent that the works engineer can once more proceed to issue electrical specifications, stating his exact requirements, with the knowledge that delivery will be given at the desired time.

Before the war it was customary to plan an installation down to very fine details, and after the plans were completed to schedule the delivery of the various items at different times as the whole work progressed. If the time has not yet quite arrived when we can work on these lines with the same freedom from worry with regard to accessories arriving on time, nevertheless it is now fast approaching. Engineers are at present engaged to a large extent in clearing up various temporary or hybrid installations that were impressed on them in the past through force of circumstances, but once this leeway is made up, new installations can be planned and carried through, with just as much efficiency and attention to minute detail as previously.

Two other great advantages are also obvious as a result of this return to more normal delivery periods. First, the question of the engineer's preference for any one class or manufacture of component or apparatus can once again be considered. As an example of this the works engineer may have always preferred motor starting equipment to be fitted with isolating switches, fully interlocked with the starter contactor or circuit breaker, or possibly with the overload releases fitted with a special type of adjustable time-lag.

Special Requirements

Over the past few years he has considered himself fortunate to have obtained any control gear of the right capacity and type that would do the job and be delivered in time for his programme, but now he can once more afford to indulge his special requirements. Or, again, an engineer who has been forced to depart from his policy of installing oil-break hand-starting equipment con-

trolling motors of over 5 h.p., and air-break under this size, can now return to this scheme once again.

The second great advantage accruing from this return to normality in delivery periods, especially in a large factory, is that a policy of rigid standardization can once again be rigidly enforced. In pre-war days it was not only common practice for the engineer to insist on all motors being of a certain make, and groups of horse-powers to be of certain common frame sizes to facilitate rapid interchange-ability in the event of a failure, and to cut down the number of spares held for an emergency, but it was also quite usual, when ordering a new complete machine, to insist on its being equipped by the manufacturers with a certain type and make of motor, so as to fit in with the general works standardization scheme.

Now he can once again adopt this procedure, and gradually weed out the odd non-standard machines, which he has had to accept during the last decade.

This again reflects on the important question of stores stock, not only of spare motors and control gear, but also of the considerable number of small parts and accessories that have to be held available when a large variety of different makes of equipment are installed in a factory. This is especially evident with control gear and motor starters, more, in fact, than with actual motors, which, of course, need few spare parts, and the stores superintendent will be in agreement with the engineer as he is gradually able to eliminate from his stock all the numerous contacts, springs and operating coils for a large number of different manufacturers' equipment, thereby reducing the number and variety of these small parts to a reasonable figure.

The works engineer can therefore look forward to the future with confidence in this respect, for whatever pitfalls and problems lie ahead for him to solve, the fact remains that the long period of "make-do" is fast approaching its end.

Radiocommunication Link

AN interesting installation for improving communications between Port Elizabeth and Uitenhage has just been completed for the South African Post Office by Standard Telephones and Cables, Ltd. The existing eight-line telephone system between the towns proved inadequate, and in view of the difficult terrain and the time factor, it was decided to install a u.h.f. radio link, the Standard "time-sharing multiplex" system being selected. This offered 24 channels, was readily adapted to existing installations and allowed direct dialling from Uitenhage to the Port Elizabeth automatic telephone system. Magneto ringing facilities were provided from Port Elizabeth to the Uitenhage manual exchange.

The Port Elizabeth terminal is situated in the carrier terminal station at Neal Street and is connected to the central exchange by a multi-pair telephone cable. As space is limited, the transmitter and receiver bays are mounted back to back, and the terminating and signalling equipment are installed elsewhere in the building.

The Uitenhage terminal, which is normally unattended, is on a hill outside the town, and connection to the exchange is by 1.25 miles of multi-pair telephone cable. Alarms, indicating failure of any part of the equipment, or unauthorized entry into the building, are immediately signalled to the exchange.

The directive aerial systems at each terminal are half-wave dipoles in corner-type reflectors. These are mounted on lattice towers 125ft high and are connected to the equipment by 150ft co-axial feeders. The air-line distance between aerials is 14.5 miles and the route is through a range of low hills.

Maintenance is carried out by electricians trained on frequency sharing carrier systems who, after an initial training period, are finding no difficulty in understanding the very different techniques used in the pulse circuits of the system. The system deals with up to 300 calls an hour and is now completely handled by the South African Post Office authorities.

Helping the Blind

THE annual report of the National Institute for the Blind, indicates the valuable work which this Institute is doing for those who are without sight, in both the industrial and cultural spheres. The Institute has been responsible for placing blind people in industrial and other employment and during the past year over 200 blind persons have been placed in jobs of all kinds. The call upon the Institute's financial resources is heavy, and donations and subscriptions will be gratefully acknowledged by the Institute at 224-228, Great Portland Street, London, W.1.

Electric Shock Effects

Medical and Psychological Aspects

A LECTURE on some of the medical and psychological aspects of electric shock, including lightning strokes, with some of the nervous complications was delivered by Dr. Macdonald Critchley at the Institution of Electrical Engineers last week.

Physical factors of importance in determining the type of injury were referred to first. For example, fatal injuries had followed shock at 45 V, but some people could suffer shock at high voltage and get away with it, possibly because of the tendency for arcing to take place, so the victim might be blown away and intimate contact avoided. It was probable that 80 mA was dangerous (a.c.) and 500 mA must be regarded as lethal. Over a period of four years, 2½ per cent of all d.c. accidents were fatal and 25 per cent of a.c. accidents.

The resistance of human tissues was also important. That of the skin was said to be about 50,000 ohms/sq cm, but some authorities said that the skin of a man was ten times more resistant than that of a woman. Sweating and other forms of moisture lowered the skin resistance 12 times and when the body was immersed in water the skin resistance dropped 25 times. If the resistance of muscle was regarded as unity, the figure for nerve and cartilege was 2-3, for bone 15-20 and for skin 100-500. One inch of the sciatic nerve had eight times the resistance of the Atlantic cable. The duration of the current was also important; as the current passed, tissue changes occurred and the resistance dropped.

Path of Current

The points of entry and exit also determined the effect on the victim. Current which entered by the skull and left by a leg might be followed by nervous complications, while current which entered by one leg and left by the other might produce little effect beyond burning. The same current entering by one hand and passing out by the other might traverse the thorax and heart and produce cardiac failure. It was said that the left hand was especially dangerous.

Doctors believed that sex, age and robustness were of great importance. Children were more susceptible to electrical injury than adults and women more than men. Fatigue, hunger, thirst, hardening of the arteries and alcoholic indulgence the night before, all led to increased susceptibility. Easy-going, phlegmatic people tolerated electric shocks much better than excitable people. There was a difference of opinion about whether those who had experienced many minor shocks were more susceptible to a severe shock or less.

Suicide by electrical methods was uncommon, probably because of lack of opportunity and lack of knowledge, but one such suicide was apt to be followed by others. It was not an uncommon method to be chosen by adolescents.

Sensations Experienced

The subjective sensations of those who experienced an electric shock were intriguing. "Tingling" was common, which became painful and finally generalized, perhaps due in part to a spasm of the musculature. There might be temporary deafness during the passage of the current, accompanied by a roaring noise in the ears, and loss of sight due to blackness or redness in front of the eyes. A feeling of "shrinking into oneself" was not uncommon, and several people claimed to be able to feel the reversals of an alternating current. Whenever severe pain was experienced, the victim lost his sense of the passage of time, which seemed to slow up. It was difficult, therefore, to get from a patient a true statement of for how long the current was passing. However, although pain was by far the most common symptom it was not always present and one man who received a shock from an X-ray installation described it as "a most glorious feeling."

With a lightning stroke consciousness was almost always lost at once and there was a loss of memory which went back to before the actual injury—"retrograde amnesia"—which meant that when the victim came round he might be quite unaware of what had happened.

Burns might be divided into ordinary, massive gangrene, necrosis of a whole limb in severe cases and metallization of the skin. Bone injuries took the forms of cracks or fractures and in some severe cases actual tearing of the bone across from spasm of the muscle. Optical complications included eye flash or dazzle, which might cause considerable disintegration of the retina or the back of the eye, and be followed by a hysterical prolongation.

Injury to Nerves

One common sequel of lightning shock was for the victim to be paralysed from the waist downward, strength and feeling returning only gradually, but in a month or so there was perfect recovery. In electric shock the nerves, being a bad conductor of electricity, were often damaged. One result of a bad electric shock might be paralysis of the nerve of the limb concerned, and with the hand a wasting of the muscle and loss of power and feeling. This could be aggravated by hysteria. Prolonged loss of memory after an electric shock was probably a hysterical manifestation.

The late effects on the nervous system might include strokes, paralysis of a limb, epileptic fits, persistent headaches, giddiness, poor memory and sleeplessness.

The lecturer described the method of "legal electrocution" used in the United States. It was said that some victims had to receive three or four shocks before being finally killed.

There was some uncertainty as to why people died from lightning and electric shock. With high voltage it might be that the centres which governed breathing were knocked out and death might be due to loss of breath, whereas at low voltage death might be due to heart failure. If a man had no breathing and no action of the heart he was dead; if the action of the heart was restored by artificial respiration it might be too late from the point of view of useful survival, because the brain cells could not tolerate being cut off from their blood supply and oxygen for more than a few minutes, and the victim, while recovering his life, might not recover his reason. In most cases, however, the heart action went on all the time, though very feebly, and with artificial respiration a good recovery should be made. If no doctor was present, it would be wise to continue artificial respiration for three-quarters of an hour; if a doctor was there, one should be guided by him.

Electrical injuries were much less common in Great Britain than on the Continent or in the United States, due to the fact that we were much more careful and had very stringent regulations for factories. The great weakness was that there was no control over defective electrical apparatus in the home.

Dr. Macdonald Critchley replied to a large number of questions. In doing so, he mentioned that following a lightning stroke a victim might not be rendered unconscious but might pass into a curious dazed state, a form of automatism, due to partial concussion caused by a pressure wave acting on the brain. In speaking of "hysteria," he explained, he was using the word in its medical sense, as referring to psychological diseases which were produced by suggestion and which could be cured by suggestion. Usually the underlying factor which kept the hysteria going was a motive and often the motive was a sordid one.

Suez Power Station Extension

THE Suez power station, which was recently brought into service and officially opened by His Excellency the Governor of Suez, Mohamed Bey Riad, has now been extended by the addition of new generating plant supplied by the General Electric Co., Ltd. The new plant consists of a 1,025 kVA, 3,000/3,300 V, 375 r.p.m. G.E.C. alternator driven by a 1,250 h.p. supercharged Mirrlees diesel engine. The control boards, which embody switchgear, meters and relays, also manufactured by the G.E.C., were erected and installed by the Egyptian agents of the company, the Tractor and Engineering Co., S.A.E., which was also responsible for the installation of the alternator. This extension forms part of a large programme of post-war development undertaken by the Egyptian Government. Two further 774 kVA G.E.C. alternators have already been shipped for installation at Zagazig in furtherance of this scheme.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. Erroll asked the Postmaster-General what annual rentals he expected to receive for the use of the General Post Office cable and the radio link joining Alexandra Palace with the new Sutton Coldfield transmitter.

Mr. Hobson said that the annual rental of the link, whether the cable or the radio system was used, would be of the order of £50,000.

The Vactric Loan

Mr. Erroll asked the Chancellor of the Exchequer what were the prospects of an early repayment of the Government loan of £340,000 to Vactric, Ltd.; and from what sources it was expected that the company would find the money.

Sir Stafford Cripps said it was for the directors, in the first instance, to propose the timing and method of repayment of the Government loan which they regarded as possible and he could not anticipate any proposal on this subject which they might make in due course.

Generation at Bankside

Sir Arnold Gridley asked the Minister of Fuel what annual ouput was expected from Bankside power station, assuming a 40 per cent load factor.

Mr. Gaitskell replied that it would be 840,000,000 kWh when the station was completed.

Sir Arnold asked if the Minister was aware that as a result of the decision to burn oil there would be an increase in cost of production of about 0.1d per kWh, and if this meant that the consumers would have to bear it.

Mr. Gaitskell said that the figure was approximately correct, but that was taken into account at the time arrangements were made and it was felt that the amenity grounds were sufficient to warrant it.

Damages Against Southern Electricity Board

AT Bristol Assizes last week Mr. Gordon Bulson, Branscombe, Harden Huish, near Chippenham, claimed damages from the Southern Electricity Board for loss resulting from a fire at his house in July, 1947. (At the time of the incident the district was served by the Board's predecessors, the Wessex Electricity Co.)

Mr. J. D. Caswell, K.C., for the plaintiff, stated that the agreed damages totalled £1,639. He alleged that the cause of the fire was a leakage of current in a service cable or meter, for the maintenance and installation of which the company was responsible.

In July, 1947, Mr. Bulson and his wife left the house for their holidays, having turned off the gas and electricity. A few days later a painter went to the house to do work in the kitchen. He used no heat or light and noticed that the electric clock was stopped, which meant there was no current passing through the system. The next morning a passer-by noticed smoke coming through the tiles and told the police. Fire Brigade men found that the fire had apparently originated under the stairs. The outbreak was confined to the hall staircase and upper landing.

Divisional Officer George Braincourt, Chippenham Fire Brigade, who examined the premises, expressed the view that the fire originated under the cupboard under the stairs, and considered the meter-board there had been ignited by insulation burning. One feature was the complete fusion of the intake cables, which had settled in a molten blob in the wall.

Mr. J. Scott-Henderson, K.C., for the defence, cross-examined Mr. William Parker, of London, a member of the Institution of Electrical Engineers for over 1½ hours. Mr. Parker said it was bad practice to place the meter-board over the cable, it being more normal to bring the cable either from above, below or to one side of the board so that it could be examined for maintenance. Any bend in the cable should be avoided.

Mr. J. A. Pedler, for 41 years employed by Bristol Corporation, said that the chance of the tail-ends on the meter-board or the consumer's switches causing the fire was very remote.

Opening the defence, Mr. J. Scott-Henderson said that nobody could say definitely what the cause of the fire was. It was not enough to specify possible causes. The important issue was whether there was a defect in the defendants' installation. If a fire occurred and the electrical apparatus was burnt out it was easy to say that one possible cause of the fire was the supply put in by the authority.

Mr. J. D. Caswell, K.C., for the plaintiff,

asked Mr. Harold Bright, consulting engineer, who was called by the defence, if it was his view that the fire had an electrical cause. Mr. Bright replied that that was the most likely thing. He thought the fire caused an electrical fault on the consumer's side of the meter panel to occur at some time, but he could not see any electric thing that might have caused it.

Giving judgment, Mr. Commissioner Clarke awarded the amount claimed by Mr. Bulson, with costs, but granted a stay of execution of 21 days while the question of an appeal was being considered by the Board. He accepted Mr. Bulson's evidence that he had switched off before leaving for his holidays. He was satisfied that the plaintiff had established that the only part of the installation in which there was electricity at the time of the outbreak was the part that was in the control of the suppliers (the defendants). There was nothing which would justify his holding that the outbreak was due to a non-electrical fault.

Sub-Miniature Valves

THE new flat sub-miniature valves recently announced by Mullard Electronic Products, Ltd., are stated to be the smallest hearing aid valves in the world. They are only one-fortieth the size of an average radio receiving valve and one-twelfth the size of the first valves of this class that the company produced in 1936. The dimensions are 8.5 mm wide by 6.1 mm thick by 28 mm or 35 mm long, according to the type. The saving in space over current American types amounts to over a quarter.

Three Mullard flat sub-miniature valves lodged in a thimble suitably packed to form a mounting

Having filament currents of only 15 mA as against 25 mA for the Mullard 10 mm types, these new valves make possible the development of complete Monopack hearing aids weighing less than 5 oz and providing a useful life of between 36 and 60 hours before replacement of the l.t. battery is necessary.

Despite the reduction in size and the saving of filament current, the performance of these sub-miniatures is actually better than that of the larger 10 mm types. This is mainly due to improvements in the design of the filament and grid systems.

The two valves at present available are the voltage amplifier pentode DF66 and the output pentode DL66. Both are designed for use with a 22.5 volt h.t. battery and are characterized by freedom from microphony. Using a 22.5 V h.t. battery, the DF66 will give a voltage gain of about 30db per stage. This represents an increase of one or two db on the equivalent to mm valves. The DL66 will give an output of approximately 2.5 mW at no more than 10 per cent distortion, which is sufficient to meet the demands of 70 per cent of the hearing aids at present being manufactured.

B.E.A. Dramatic Section

FOR their first venture the Portland Players (the amateur dramatic section of the B.E.A. Sports and Social Club) chose "Meet the Family," a two-act comedy by J. J. Melluish. It was produced at Portland Hall, London, W.1, on Thursday and Friday last week. The cast of about a dozen did very well and drew crowded "houses". The producer was Mrs. E. M. Manning, who also played the part of a cook with assurance and ability, and who, at the close of Friday's performance, expressed her appreciation of the players' co-operation. Others taking part in the play were Lawrence Clark, Margaret Stratton, Gloria Dennis, Renee Futcher, Anthony Hemming, Ken Wheeler, Michael Marcus, Frank Swann, Jean Ward and Alec. McKenzie. Mr. S. Depledge acted as stage manager and Mr. A. W. Brown was responsible for the lighting.

Commerce and Industry

Engineering Wages Claim
Railway Goods Delivery Vehicles

LAST week at a meeting between representatives of the Engineering Employers' Federation and the Confederation of Engineering and Shipbuilding Unions, the president of the Confederation (Mr. H. Brotherton) announced his unions' intention of persisting with their claim for a £1 a week addition to the wages of their members. He claimed that this could be paid out of the increased profits being made by the engineering industry, but Sir Alexander Ramsay, for the Employers' Federation, said that while the employers would consider the unions' chaim and the submissions made, but pointed out that in addition to the huge sums taken by taxation the engineering industry had to provide heavy amounts for depreciation and re-equipment.

Electric "Horses"

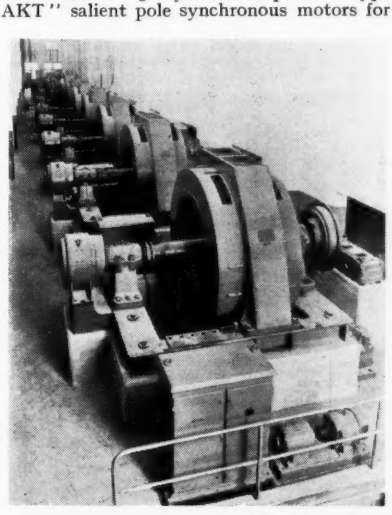
British Railways are experimenting with electric "horses" for road collection and delivery services for goods traffic and with electric vans for parcels traffic. A number of British firms have already produced prototype electric vehicles designed for railway cartage work and the following are now undergoing tests in service: a 30 cwt electric horse at Eastbourne; 2 ton horses at Hull and King's Cross; 1 ton parcels vans (of different types) in Glasgow and Bath; a 25 cwt parcels van at Hull and a 2 ton parcels van at King's Cross. The "horses" can be coupled to or released from a trailer in a few seconds, and they can turn in little more than their own length. They are supplied with batteries which have sufficient power for a normal day's work.

L.C.C. Post-war Housing

In December, 1945, the London County Council established a new organization under its director of housing and valuer, to deal with its post-war housing programme, which provides for up to 200,000 permanent dwellings. Of this programme the immediate objective was 100,000 new permanent dwellings. The story of how the Council is tackling its immediate programme and the progress which has been made has now been published with the title "A Survey of the Post-War Housing Work of the London County Council, 1945-49." This is a well-produced publication of eighty pages with many excellently reproduced photographs of new dwellings and layout plans of work in progress. It records that up to the end of June this year 32,500 homes have been provided of which 16,700 are permanent dwellings and describes and illustrates the various housing estates, their architectural features, and the domestic equipment installed, much of which is electrical. The book is designed to interest the general reader as well as those professionally concerned. Copies (5s 6d post free) can be purchased from the Council's Information Bureau, County Hall, (Room 8, South Block), London, S.E.1, or through any bookseller.

Motors for Wood Pulp Grinders

Seven 2,500 h.p. 300 r.p.m. unity power factor 6,600 V 50-cycle, three-phase "Type AKT" salient pole synchronous motors for



B.T.H. 2,500 h.p. synchronous motors for driving newsprint wood pulp grinders in Tasmania

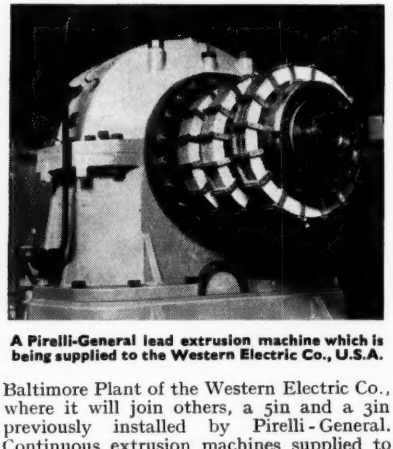
wood pulp grinders were recently supplied by the British Thomson-Houston Co., to Australian Newsprint Mills Pty., Ltd., Tasmania. The motors were designed for switching direct on the line and are shown

in the accompanying picture. Early delivery was a vital factor in connection with this contract and consequently it was imperative to adopt standard designs. The project had emerged from the Australian effort to save dollars, and in giving sanction to the scheme the authorities stipulated the production dates at the mill as a condition of their approval.

The specified starting data in order to avoid too great a line disturbance was: Starting current (direct-on-line), 3.5 to 4 times full load current; starting torque, 55 per cent full load torque; pull-in torque, 40 to 45 per cent full load torque. Tests on site showed that these "Type AKT" motors met the specified conditions with a margin to spare. When switched direct-on-line the current registered was approximately $3\frac{1}{2}$ times full load current and the voltage drop did not exceed 3 per cent. Synchronous speed was reached in three seconds. Previously, three of the B.T.H. Company's 3,600 h.p. slip-ring induction motors with phase-advancers had been supplied to the same customer.

Lead Extrusion Machine for America

The Pirelli-General Cable Works, Ltd., of Southampton has just shipped to the United States one of the latest 5in lead extrusion machines from its range of patented cable sheathing equipment. This machine is now in transit and is shortly to be installed in the



A Pirelli-General lead extrusion machine which is being supplied to the Western Electric Co., U.S.A.

Baltimore Plant of the Western Electric Co., where it will join others, a 5in and a 3in previously installed by Pirelli-General. Continuous extrusion machines supplied to North America by this company now total eight. Three have gone to Canada and five to the United States.

Another recent installation forms part of a $1,000,000 expansion and improvement programme at the Marion Indiana factory of the Anaconda Wire and Cable Co., where a 3in machine has been erected under the supervision of one of the Pirelli-General Company's engineers, delivery being effected ahead of schedule.

Public Transport Association

The 1950 Conference of the Public Transport Association will be held at Brighton from 25th to 27th April. The Conference headquarters will be at the Metropole Hotel and business sessions and other functions will be held in the Royal Pavilion Estate.

Electric Circuits

The eighth edition of "Lektrik Lighting Connections" has been published at 3s 6d by A. P. Lundberg & Sons., Ltd., Credeuda Works, Rood End Road, Oldbury, near Birmingham. This useful little book has been completely revised and rewritten, the illustrations have been brought up to date and a great deal of additional information has been included. The first part of the book is new and it deals with the fundamentals of electricity, generators, transformers, distribution networks, fuses and switches of all kinds. This section covers only 36 pages, but it is written and illustrated in such a way that after reading it the average electrician will understand the basic theoretical principles upon which his work is founded. The main body of the book will be familiar to those who possess previous editions, but it has been amplified to make the control of l.v. circuits more easily understandable. There is also a useful section of appendices.

Enamel Manufacturers' Sales Conference

The annual sales conference of Donald Macpherson & Co., Ltd., was held on 18th November at the Palace Hotel, Buxton. Owing to the unavoidable absence of the chairman and managing director, Mr. R. P. Chester, the deputy managing director of the company, Mr. S. W. Chester presided. Mr. W. A. Lowe, director in charge of decorative and gas sales, Mr. D McR. Massie, director in charge of industrial sales, Mr. T. Raines, director in charge of production for Manchester and Mitcham, and Mr. H. M. Rowe, director in charge of finance and accounts, also attended. Thirty-six members of the internal and external sales departments were present. It was announced that Mr. T. H. Bartram (Manchester) had been appointed sales manager on the decorative side, Mr. E. H. Chaplin, sales manager on the industrial side and Mr. M. Pool (Manchester), sales manager on the gas side. On the following day a visit was paid to the Warth Mill Works, Bury, which

has been purchased by the company to co-ordinate and extend the manufacturing capacity of its products.

Clock Window-Competition

The results of the window dressing competition organized by Smiths English Clocks, Ltd., have now been announced. The first prize has been awarded to the High Street, Sutton, showroom of the South Eastern Electricity Board, the second prize to Mr. S. J. Sturgeon, The Broadway, St. Ives, Huntingdon, and the third to Mr. G. D. Fletcher, Owen & Owen, Ltd., Liverpool. A number of consolation prizes have also been awarded.

Trade Announcements

Warren Products, Ltd., 72, Victoria Street, London, S.W.1, have taken over the marketing in the United Kingdom of the "Marley" illuminated mirror in its new and improved form.

Mr. R. D. McCraith, 216, King Street, Castle-Douglas, informs us that he has purchased the electrical and radio business of G. M. Pearson, at 12, High Street, Lockerbie, and that the business will now be carried on under his name. All purchasing, etc., will be dealt with from Castle-Douglas.

The appointment of two new representatives handling the company's lighting activities is announced by **Ekco-Ensign Electric, Ltd.** They are Mr. B. T. Lamb, 55, Buchanan Road, Rugby, who will cover Leicestershire, Northamptonshire and Rutland, and Mr. T. Lines, 347, Allesley Old Road, Coventry, covering Warwickshire and Worcestershire. Both representatives will be based on the Ekco-Ensign Midland sales office, 40-42, Summer Row, Birmingham, 3 (Central 2997).

A new wholesale branch has been opened by the **Wholesale Fittings Co., Ltd.,** at 226-226a, High Street, Croydon, Surrey, (Telephone: Croydon 7984).

Mr. J. Bridge, who has been technical representative in the South of England for **British Moulded Plastics, Ltd.,** has now moved back to the London area and is acting as technical representative to the company's customers in the radio trade.

Jessop & Boydell, Ltd., have removed to 116, Manningham Lane, Bradford.

Philips Sales Conference

On 18th November, Philips Electrical, Ltd., held the last of a series of one-day regional sales conferences. This took place at the Waldorf Hotel, London. At this and previous meetings, which were held in Edinburgh, Manchester and Birmingham, all representatives of all the product groups in the area attended.

Candadian Approvals Agreement

As the result of the work of the delegation to Canada led by Mr. D. M. Buist, of B.E.A.M.A., arrangements have been approved in principle whereby the British Standards Institution will act as agent for the Canadian Standards Association and conduct all preliminary testing of equipment in the United Kingdom before final approval is given by C.S.A. headquarters in Toronto. This will guard against the return of apparatus from Canada as unsuitable. Two C.S.A. engineers will arrive here in January for the purpose of training two B.S.I. engineers in the work so that the B.S.I. will eventually take over.

Works Visit

Among the works visited by the Productivity Team representing the British electric motor starting & control gear & small air-break switchgear industry before it sailed for the United States was the Perry Barr works of George Ellison, Ltd., where the members of the team saw the various stages in the manufacture of Ellison switchgear.

Old Nions

The annual dinner of the Old Nions Association will be held on 16th December at the Criterion Restaurant, Piccadilly Circus, London, when the principal guest will be Air Marshal Sir Cyril B. Cooke.

Change of Name

The General Gas & Electricity Co., Ltd., has changed its name to Reliance-Clifton Cables & Industrial Products, Ltd.

Catalogues and Lists

Brush Electrical Engineering Co., Ltd., Loughborough.—Illustrated brochure describing diesel-electric locomotives.

National Fire Protection Co., Ltd., Station Road, Leatherhead, Surrey.—Brochure on "Essex" methyl bromide extinguishers for electrical fires.

Elexcel, Ltd., Victor Works, Broadgreen, Liverpool, 14.—Priced catalogue of "Xcel" domestic electric appliances.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced catalogue of "Mutac" silent a.c. switches and accessories.

W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1.—Folder and catalogue on the Henley farm wiring system.

Smithfield Show

ELECTRICAL EQUIPMENT FOR FARMERS

IF electricity were normally used for all the equipment seen electrically operated at the Smithfield Show and Agricultural Machinery at Earls Court this week, the rural electrical development engineer could retire from business. Owing to lack of electrical services, however, coupled with insufficient knowledge on the part of the farmer, especially with regard to the low cost of employing electricity to assist him, there is a good way yet to go before this state of affairs is likely to be attained.

One display of especial electrical interest is that of the British Thomson-Houston Co., Ltd., which shows a wide range of electrical equipment suitable for use on farms and dairies. Convenience and ease of starting are foremost among the advantages of electric drives emphasized in a selection of motors, suggested applications for which are pumping, milking, sheep shearing, etc. Geared motor units are particularly useful for the low speed drives usually required for agricultural machinery, and a 3 h.p. unit fitted with "Perspex" windows enables visitors to inspect the gear-train in motion. A feature is also made of control gear, including motor starters and float switches. B.T.H. industrial heating elements are admirably suited for steam boilers and sterilizers, and units up to 15 kW are exhibited. "Mazda" fluorescent fittings with cool shadow-free light are very suitable for modern cowsheds and dairies where cleanliness is of prime importance.

Welding Demonstration

A striking demonstration of the use of electric welding plant in smithies and small agricultural workshops has been arranged by the English Electric Co., who, besides showing the apparatus itself, indicate typical ways in which the farmer can utilize it for repairing his equipment, making structural steelwork, gates, etc. The plant, which includes a portable a.c. welding set and the recently introduced high frequency ionizer equipment, is demonstrated through the window of a booth arranged to look like a farm building. A voltmeter and ammeter indicate the power consumed while the welder is being used.

Grain and grass drying also come in for a good deal of attention. A working model of the Ransomes Davies dryer is to be seen on the Ransomes, Sims & Jefferies' stand, while actual plant is included in the displays of Nu-Way Heating Plants, Ltd., the Ivo Engineering and Construction Co., Ltd., and the Templewood Engineering Co., Ltd., the last-mentioned company's grass drying plant being accompanied by a provender press for producing dairy cubes, stock cubes and poultry pellets from the dried grass meal.

Power-operated Grinders

Grinding plants are well represented. The three types of "ScotMec" hammer mill shown by Kerry's (G.B.), Ltd., are available in three types—meal chest, direct grinding and elevating: one unit is demonstrated with an automatic power cut-off for night use. In addition to the well-known "Essex Major" 3 h.p. hammer mill, Christy & Norris, Ltd., show the "Briton" 15 h.p. model. A new mill embodying the "Fyna" flail principle is included in a comprehensive range of apparatus exhibited by Fyna Industries, Ltd.

Mechanical and pneumatic conveyors; hoists; potato, tomato and fruit graders; seed cleaning apparatus; air compressors; mincers, slicers, fillers and similar food preparation equipment are a few of the other electrically operated items to be seen. Much additional apparatus shown had previously been on view at the Dairy Show at Olympia at the end of October. This applies particularly to such items as milking machines, sterilizers, boilers, milk coolers, bottle washers, butter churns, cold storage plant, pumps, poultry apparatus, horse and cattle shearing apparatus, electric fences and generating sets. Also those who visited the International Motor Exhibition at Earls Court two months ago will have seen most of the electrical equipment shown associated with farm vehicles.

The show closes this (Friday) evening.

Lighting Ban Temporarily Lifted

THE Minister of Fuel and Power has granted a licence (the Electric Lighting (Restriction) General (No. 2) Licence, 1949, S.I. 1949 No. 2217) permitting the use of electricity for business advertisement at any time on 26th and 27th December in England and Wales and on 2nd and 3rd January in Scotland.

Restrictions on the standard of lighting in shops, hotels, restaurants, etc., on those days have also been relaxed.

Plant Extension Problems

THE annual dinner of the Ipswich and District Electrical Association was held at Felixstowe on 2nd December, Mr. F. L. Best presiding. Among the speakers was Mr. G. A. Vowles, controller of the Yorkshire Division of the British Electricity Authority, who said that the capital expenditure involved in the growth of the electricity supply industry was beyond the capacity of a company or even municipalities. On the generating side, where the cost used to be about £16 per kW it was now £50, and there was no sign of its finishing there. The B.E.A. aimed at closing the gap in the estimated maximum demand by 1953-54, but whether it would be successful was entirely out of its control. The Authority was in the hands of manufacturers, who were now called upon to do four or five times the amount of work for which they catered for when they built their factories. Another problem was restriction on capital expenditure. The Authority had a programme for twenty-four new stations and for extensions to sixty-seven existing stations.

Mr. R. R. Stokes, M.P. for Ipswich, said that the nationalized industry was proving very efficient. Other speakers were Mr. C. T. Melling, president of the Association and chairman of the Eastern Electricity Board; Mr. E. F. Steward, chairman of the South Western Electricity Board; and Ald. A. J. Cooke, Mayor of Ipswich.

A Silver Thimble

ONE of the historic romances of the nineteenth century, the laying of the first transatlantic telegraph cable in 1866, is recalled by the gift to the Science Museum, South Kensington, of a little silver thimble.

As an experiment, the two cable ends were connected together in Newfoundland and an electric battery current was passed through the cables from Valentia (Ireland) and back again, a distance of some 3,700 miles, the current being strong enough after its double journey across the ocean to deflect the reflecting galvanometer which had recently been devised by Prof. William Thomson, later Lord Kelvin.

The "battery" used for that simple test was a silver thimble (containing a few drops of acid and a zinc wire) which had been borrowed from Miss Emily FitzGerald, daughter of the Knight of Kerry, upon whose land was erected the building known as Telegraph House in which the submarine cables terminated. The thimble then used has recently been given to the Science Museum in London by Mr. R. B. FitzGerald, a nephew of the late owner.

Broome Park

IT is just three years ago that the Electrical Industries Benevolent Association announced the gift to the Association of a Georgian mansion, Broome Park, Betchworth, Surrey, for the purpose of accommodating elderly beneficiaries. The donors were Mr. and Mrs. Joseph Cunning who gave the estate as a memorial to their son, Mr. J. A. Cunning, who lost his life while serving in the R.A.F. during the war. The first residents arrived at Broome Park in March last year and now thirteen people live there.

To commemorate the gift an illuminated parchment has been produced by Mr. L. H. Guest (it is illustrated herewith) and is to hang in the entrance hall of the house.

THIS HOUSE
was built about
the year 1765 by C. Kilby, Esq.,
on the site of an earlier building
believed to have been a monastery.
From that time the estate was known
as Broome Park; earlier the valley
was known as Tranquil Dale. In
1933 it passed into the possession of
Mr & Mrs Joseph Cunning, & by their
gracious gift in 1946 the House
together with twenty-five acres was
entrusted to the Electrical Industries
Benevolent Association to be a place
where people associated with the
Electrical Industry & retired from
active life might find peace & happiness,
and as a memorial to their beloved
son, Pilot Officer James Erskine Cunning,
who was killed in action in 1941 in
the war to save freedom.

Commemoration parchment for Broome Park

Television Distorted

IN the 6th December issue of the *Daily Mail* there appeared an article in which the British and French television systems were compared to the grave disadvantage of the former. The writer, John Hall, said that regular televiewers here were rarely conscious of the lines with the 405-line system but it was not difficult to see them. With the French 819-line standard it was difficult to see the lines. It was admitted that the French system was still in the experimental stages and for the next eight years France would have low-definition transmissions as well. It was thought that it would take two years to overcome technical problems associated with the 819-line method.

The *Daily Mail*'s comparison of British and French television

British televiewers were warned not to be dissatisfied or apprehensive as there was no danger of their sets becoming useless for a number of years. This was all right so far as it went, but with the article there were reproduced what were stated to be photographs of a woman on television screens at 405 lines and 819 lines. The lines were certainly more visible on the former but the face had been lengthened by a distortion easily achieved by a maladjustment of the controls,—that is not playing the game.

Indian Cable Factory

THE Government of India has concluded an agreement with Standard Telephones and Cables, Ltd., for the establishment of a factory in India for the manufacture of all of the country's requirements of communications cables including those for subscriber-to-exchange connections, for long-distance trunk circuits and for multi-channel transmission systems. The agreement is for a period of twenty years, during which time Standard are appointed technical consultants to the Indian Government, who will thus be free to use all of Standard's present and future cable patents. In return, Standard will be permitted to use in their own factories any patents or improvements in manufacturing technique which may emerge from the Indian factory.

The factory and plant, all of which will, it is expected, be purchased in Great Britain, will be Government owned and operated, employing eventually all-Indian staff and operatives. It is anticipated that the output of the unit will reach a value of £750,000 per annum in three or four years' time, and provision will be made for the inclusion of facilities for the manufacture of new types of cable as they are developed.

Standard Telephones will advise the Government on the design of the factory and will prepare the plans. Indian staff will undergo training and instruction in the Standard factories in England, but the company will also provide from its own organization key personnel, who will assist until the factory is in full operation.

The Government has the right to supply telephone cables from its factory to the Administrations of Burma, Ceylon and Nepal as well as to the non-Government market in India. Telephone cable demands of the Government which cannot be produced in its own factory will be supplied by Standard Telephones and Cables.

Electrical Machinery Traders

THE annual dinner-dance of the Association of Electrical Machinery Traders was held on Friday last week at the Savoy Hotel, London, W.C.2, about 300 members with their guests and friends attending. This function is essentially a ladies' night, and the speeches were therefore confined to a toast to the guests, proposed by Mr. R. A. Joseph, chairman of the Association, and the response by Mr. W. J. Bird, of the G.E.C. Mr. Joseph spoke mainly in light vein, but for a few moments he dwelt upon the great amount of work which the Association had done during the past year and the negotiations which it had undertaken with various Government Departments on behalf of its members. He paid tribute to the work of Mr. W. E. Lawton, the president, and Mr. J. T. Morgan, the secretary, and emphasized the importance of the spirit of friendship which existed among the members of the Association. Mr. Bird replied with a witty speech in which he congratulated the Association upon its achievements. Mr. Lawton made a persuasive appeal for the Electrical Industries Benevolent Association, and from a number of prizes distributed during the evening the E.I.B.A. will benefit by over £76.

Electricity Supply

£4,000,000 B.E.A. Contracts : Power Station Inquiry

DURING the past month contracts have been placed by the British Electricity Authority for power station, switching and transforming station and transmission equipment amounting in the aggregate to £4,106,716. The principal contracts include the following :—

Two jetty cranes, Barking "C" generating station (Stothert & Pitt); inlet culverts, coal store, pump house extension and river bank works, Barking "C" (Sir Robert McAlpine & Sons); completion of superstructure, Battersea "B" (Taylor Woodrow Construction); civil engineering works for filtration plant, etc., Croydon station (Concrete Piling, Ltd.); boiler feed pumps, Littlebrook "C" (Mather & Platt); superstructure, Clarence Dock, Liverpool (Wm. Moss & Sons); 33 kV switchgear and associated equipment, Plymouth power station, and 132 kV 3,500 MVA switchgear, Usk Mouth station (Metropolitan-Vickers); two electrostatic precipitators, Kirkstall, Leeds (Lodge-Cottrell); 3,000 V and 415 V switchgear, North Tees station (A. Reyrolle & Co.); 132 kV and lower voltage cables, Braehead station, Glasgow (Pirelli-General Cable Works); circulating water ducts, Usk Mouth (John Morgan (Builders), Ltd.); cooling tower, Skelton Grange, Leeds (J. L. Keir & Co.); 60 MVA, 132/33 kV transformers and earthing transformers, Churchill substation, Somerset (English Electric Co.); 45 MVA 132/33 kV transformers and earthing transformers, Rye House station, Herts (Fuller Electrical and Manufacturing Co.); 60 MVA 132/33 kV transformers and earthing transformers, Welham Green substation, Herts, 30 MVA 132/33 kV transformers and earthing transformers, Rugby substation, and 60 MVA 132/66 kV transformers and earthing transformers, Cwmbran substation, Mon (British Thomson-Houston Co.); and 132 kV overhead line, Crewe-Knutsford (Watsham's, Ltd).

Council Criticizes Board

Sharp criticism of an account for £1,198 submitted by the Yorkshire Electricity Board was made at last week's meeting of the Scunthorpe Town Council, and the account was ordered to be returned, with a protest that the charges for repair and maintenance were excessive. The items queried were £374 for maintenance of remote control equipment, £378 for lamp renewals and sundries, and £445 for patrolling and maintenance of fittings. Councillor D. Dodd, chairman of the Public Lighting Committee, said the members were indignant that the Board had demanded that the charge for the remote control equipment should be on a per lamp basis. More than six months ago the Board was asked to change the street lamps from 60 to 150 W, and it was deplorable that such slow progress had been made.

Doncaster Inquiry

The chief engineering inspector of the Ministry of Fuel and Power (Mr. A. N. East) is to conduct an inquiry at the Mansion House, Doncaster, on 10th January into an application by the British Electricity Authority for consent to the establishment of a new generating station on a site of 52 acres at Crimpsall, Doncaster. The initial installation will comprise two 30MW turbo-alternators and four 180,000 lb/hr boilers.

Reduced Flat Rates

After the reading of the meters for the December quarter all flat rates of the South Eastern Electricity Board above 7d per kWh (8d for prepayment supplies) will be reduced to those figures. The reductions will benefit 15,000 consumers and will apply in the Banstead, Crawley, Dorking, East Grinstead, Gravesend, Herne Bay, Leatherhead, Lewes, Peacehaven, Ringmer, Weybridge and Worthing Districts. Most consumers already take supplies on the much cheaper two-part tariffs offered by the Board.

Queensland's Coal Resources

A report prepared by Powell Duffryn Technical Services, Ltd., on the coal resources of Queensland has recently been published by the State Government. After dealing with the general question of exploiting these resources the report says that on considering the various specialized uses of Queensland coals regard must be paid solely to processes which may be of direct interest to the State. The lines of development which it is suggested should be studied include the establishment of an iron and steel industry; production of solid or liquid organic products from per-hydrous coals; establishment of industries based on

cheap electric power; underground gasification; and the production of liquid fuels and various by-products. It is felt that the availability in certain areas of cheap coal for power production is sufficient to justify the careful investigation of the possibility of attracting certain electro-chemical industries, such as electric smelting and the manufacture of carbide, aluminium, magnesium, etc.

Ministry and Illuminations

Wallasey Corporation has been told that the Ministry of Health is not prepared to grant loan sanction at present for the installation at New Brighton of illuminations on a larger scale than those displayed last summer. The Ministry suggested that the scheme, estimated to cost from £5,000 to £10,000, should be deferred until economic conditions are more favourable.

Cables on Estates

Darlington Town Council has been informed of the conditions under which the North Eastern Electricity Board is prepared to supply electricity to new housing estates. In order not to delay the housing programme, the Council has instructed the borough engineer to prepare cable ducts in roadways, in accordance with the Board's wishes, without prejudice as to the liability of the Council. The question of the proposed new charges is to be taken up between the town clerk and the Board.

Supply Extensions

The South-East Scotland Electricity Board is to supply electricity to the village of Millfield and the Ford Estate, Glendale (Northumberland). An extension of the electricity supply to Lowick has been approved.

Plant Extensions in Israel

All restrictions on electricity consumption in Israel will be lifted by the end of this year when the installation of a new 30,000 kW turbo-generator is completed. With a capacity of 96,000 kW, the Palestine Electric Co.'s two power stations at Tel Aviv, the capital, and Haifa, the main port, will be able to generate enough electricity to meet the country's demands. A second 30,000 kW turbo-generator, ordered in Britain in 1947, is expected to be put into service in 1951, and further plans to increase the country's power supply are already being prepared, the company states.

Restrictions on the use of power were brought into force when the 18,000 kW hydro-electric station at Naharaim, on the Jordan, fell to the Arabs in May, 1948. The loss of this station left the Palestine Electric Corporation with a generating capacity of only 54,000 kW, but a few months later additional installations at the Reading station in Tel Aviv raised the output by another 12,000 kW. Restrictions on the use of power and in homes during certain periods of the day were strictly enforced.

The Jerusalem Electric and Public Utilities Corporation is now considering steps to provide power for the Arab area—the Old City, Bethlehem and Ramallah—and it is understood that portable generators are being contemplated as a part answer to the problem.

Gasification of Coal

Ministry of Fuel Trial Installation

THE beginning of the first attempt to gasify coal underground in England was witnessed by the Minister of Fuel and Power on 24th November, when drilling commenced on the Fox Earth seam (Newman Spinney), near Chesterfield.

The experiment is to be conducted by the Ministry on a small scale, involving the expenditure of not more than £3,000 monthly for several months, on a site which provides easy access to the coal because the face of one upper seam, about 18in thick, has already been exposed by opencast working, and it is likely to remain so for some months while a lower seam, some 50ft below, is being worked normally. The experiment will not delay restoration of the site after the opencast work has been completed, as the land is not agricultural, but has a scrub surface.

The procedure will be to blow compressed air (possibly with some steam) down a 4in bore hole drilled in the seam to support combustion by reaction of the oxygen in the air with the coal, the gas evolved being extracted through a second passage driven into the seam. Ignition will be by some kind of thermal bomb, and it is hoped to convert all the coal into gas without leaving coke behind.

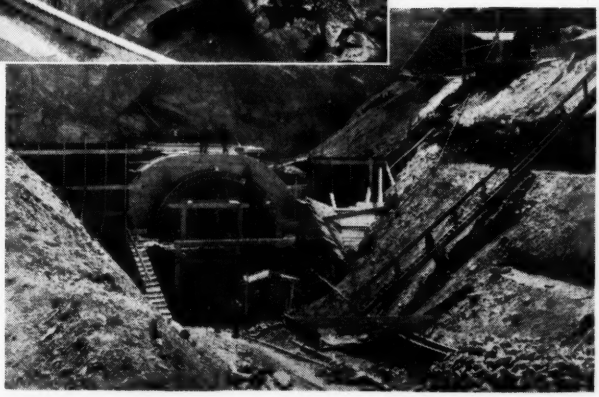
The indications are that the resultant gas will be of too low a calorific value for distribution by mixing with town's gas, but it should be of economic value for generating power by burning in a gas turbine.

The assembly of drilling rigs and other equipment should be ready for serious drilling to start about mid-December. It is hoped that ignition may be accomplished in January, and it is expected that some gas may be produced on a preliminary experimental scale early next year.

Algerian Water Power

By S. H. KAHN

RESTRICTION of the use of electric power in Algeria since 1940 has focused public attention on the general need for increased production. Within the next 20 years barrages are to be constructed which will not only produce electric power but also irrigate 400,000 hectares. The 20-year programme provides for the electrification of eight railway lines and considerable rural electrification. It has been estimated that if one-quarter of the European population adopts electric cooking and refrigeration, there will be an increase of 100 million kWh in consumption, without including needs of the native population. Irrigation will require a minimum of 80 million kWh and, including other uses, consumption is ex-



Above: Downstream view of the Kerrata barrage. Top right: Downstream end of Ahrzerouftis-Oued water tunnel. Bottom right: Outlet site indicating pressure conduit

pected to increase by at least 30 per cent. A further 120 million kWh will be needed by the food industries and 145 million kWh by industries dependent on agriculture. The amount for other industries is estimated at 355 million kWh, making a total of 1,200 million kWh.

Because coal is extremely rare in North Africa, the main effort will be to increase hydraulic production. Since most of the water becomes available in winter, regulating barrages must be constructed.

On a recent tour of North Africa I was able to see what has already been undertaken. In the Petite Kabylie, twelve plants started working between 1940 and 1949 and six others are under construction. Those depending on irrigation produce power mainly during the dry season from May to September, but by the end of the summer and in the autumn the barrages are almost empty. For this reason other schemes have been studied. in this area there is a substantial water flow which could produce 600 million kWh annually. Turbo-electric generators will be of 40,000 to 60,000 kVA with 150 kV transmission of the power.

For the Oued Agrioun undertaking there is an average flow of 180 million cu m over 420 m falls. A barrage has also been constructed above the village of Kerrata to retain 100 million cu m. The average height will be 60 m and length 400 m, and plant will be constructed at the foot of the falls. Immediately below Kerrata, a small barrage 31 m high will enable the water to enter an 8 km tunnel which will bring the water to the Ahrzerouftis Valley, where the plant is situated, part of it underground in order to use the greatest possible head of water, and also for reasons of defence in war. The plant will use a 370 m fall and will be equipped with two 40,000 kVA turbo-alternators and a 150 kV network. The Ahrzerouftis water will also be used with the aid of a small barrage upstream and a 3 km tunnel by the underground plant. The two plants will be of 80,000 kVA and 6,500 kVA.

The underground plant is expected to enter into service during the spring of 1951 and in 1952 partial filling of the Iril-Emda barrage will be undertaken for service about 1954.

Building Specialists

THE Minister of Works (the Rt. Hon. Charles W. Key) was the guest of honour at the annual luncheon at Grosvenor House, London, W., on 1st December, of the Federation of Associations of Specialists and Sub-Contractors, to which the Electrical Contractors' Association is affiliated.

Mr. W. R. Cowen, M.R.San.I., M.I.H.V.E., the Federation's president, was in the chair, and proposed the toast of "H.M. Government." In the course of his speech, Mr. Cowen referred to the harmonious relations between the Ministry of Works and the Federation. He expressed regret that the building industry's share of the cut in capital expenditure was somewhat disproportionate and suggested that the industry was not happy about the choice of the direction in which the cut was to be made—the private building of houses. He hoped that the means of re-expansion in better times would be preserved. This meant the preservation of craftsmanship and sufficient work to ensure an adequate inflow of apprentices.

In his response to the toast, Mr. Key defended the Government's policy of restricted capital expenditure as necessary to the preservation of the country's economy. He pointed out that the reduction in building and civil engineering work would amount to only 8 per cent of the total; the cuts would not apply to work in progress, and they would be imposed gradually. They must not lose sight of the need for improved efficiency. All parties in the industry had a contribution to make—architects, by applying the results of research; contractors, by improved site organization and management; and operatives by greater production. Mr. Key emphasized the value of incentive schemes.

He hoped that the reduction in expenditure would not be used as an excuse for reducing the number of apprentices. At present the recruitment was below the rate necessary to maintain a skilled force. He concluded by commending the Federation as a notable example of consultation between crafts and between industry and the Government.

Major A. C. Brooks, chairman of the Council of the Federation, proposed the health of the guests, who included prominent representatives of Government Departments, employers' organizations and trade unions, as well as architects and surveyors, etc. Mr. A. B. Knapp-Fisher, vice-president of the Royal Institute of British Architects, responded on the guests' behalf.

FINANCIAL SECTION

Company News — Stock Exchange Activities

Reports and Dividends

Vactric, Ltd.—A statement regarding the sale of his shares in the company to an American group was made by Mr. W. G. Pegley, managing director, at a meeting held on 1st December. He said that he disagreed with the wording of the chairman's statement issued with the annual report on 7th November. The negotiations for the sale of his 45 per cent holding in the company could be regarded as concluded, subject to a satisfactory settlement for repaying the Treasury loan. His own negotiations, far from being broken off, were concluded in principle in May. Although the terms and conditions had been amended since, in general the terms remained unaltered. Full details of the identity of the purchaser would be made known to shareholders when the repayment of the Treasury loan was arranged.

Oliver Pell Control, Ltd., reports a group trading loss of £14,650 for the year ended 31st March last, as compared with a profit of £3,040 for the preceding year, and after debenture interest, depreciation, provision for loss on investment in associated company, etc., there is a deficit of £37,603 (against £8,172). Against this is credited interest of subsidiary £796, and tax provision no longer required, £98, leaving a group net loss of £36,709 (against £6,727). The parent company's net loss is £33,095, increasing the debit balance to £33,105.

Cape Electric Tramways, Ltd., reports a profit for the year ended 30th June last of £50,021, as compared with £59,474 in the preceding year, to which is added £20,537 brought in, less expenditure relative to the increase of capital and formation of new South African holding company, £23,909, leaving an available balance of £46,649. The dividend is maintained at 6 per cent for the year, and the balance carried forward is £10,649.

Aerialite, Ltd., reports a consolidated trading profit for the year ended 31st May last of £146,157, as compared with £169,070 for the preceding year, and a net profit, after tax, of £58,635 (against £54,570). The ordinary dividend is maintained at 150 per cent for the year and the balance carried forward is £78,563 (against £53,893 brought in).

The Plessey Co., Ltd., reports a consolidated trading profit of £263,215 for the year ended 30th June last, as compared with £231,637 for the previous year. After providing for depreciation, income tax, etc., there is a balance available of £84,047 (against £65,221). General reserve receives £4,000, and the final ordinary dividend is 10 per cent, again making 20 per cent for the year. The balance carried forward is £115,956 (against £88,544 brought in). The profit of the parent company, after providing for tax is £82,623 (£64,766).

Vent-Axia, Ltd., is paying an interim dividend of 25 per cent, less tax, on £60,000 capital. In the preceding year the interim dividend was 100 per cent, followed by a final of 150 per cent, making 250 per cent on capital of £15,000. Last June £45,000 of reserves was capitalized for the purpose of making a bonus issue.

Hick, Hargreaves & Co., Ltd., have declared an interim dividend of 2 per cent (unchanged).

New Companies

Sealed Elements, Ltd.—Registered 24th November. Capital £2,000. Manufacturers of and dealers in sealed electric elements and other units for use in electric cookers, fires, etc. Directors: R. Easton, W. H. Pringle and G. Smith. Regd. office: Westgate, Hill Grange, Newcastle-on-Tyne.

Egro Engineering Co. (London), Ltd.—Registered 25th November. Capital £100. Electrical, wireless, oil fuel, mechanical and general electronic engineers, etc. Subscribers: E. Grosz and Mrs. Therese Grosz. Eric Grosz is the first director. Regd. office: Ashford Court, Ashford Road, W.2.

Hudson Electronic Devices, Ltd.—Registered 25th November. Capital £1,000 Directors: A. D. Hudson and D. C. Norwood. Regd. office: 36, Camomile Street, S.E.3.

Lema Electric Co., Ltd.—Registered 25th November. Capital £100. Manufacturers and repairers of and dealers in refrigerators, cold storage and air conditioning machinery, wireless and television apparatus, etc. Directors: B. Shirman, S. Shirman and J. F. F. Coatsworth. Regd. office: 49a, Britannia Road, Fulham, S.W.6.

F. H. Wheeler (Bristol), Ltd.—Registered 29th November. Capital £1,000. To carry on the business of electrical contractors, engineers, manufacturers of and dealers in dynamos, motors, armatures, batteries, etc. Directors: F. H. Wheeler, F. Harrington (secretary), 94, Northern Road, Wickersley, nr. Rotherham, and E. E. Fields.

Elprod, Ltd.—Registered 16th November. Capital £1,000. Agents for the sale of and wholesale and retail dealers in and manufacturers of artificial lighting apparatus, electrical plant, etc. A. W. Phillips is the first director. Regd. office: 27, Park Place, Cardiff.

Southern T.V. Distributors, Ltd.—Registered 19th November. Capital £1,000. Manufacturers of and dealers in electrical and mechanical apparatus, wireless sets, etc. Directors: J. James and Mollie J. James. Regd. office: 146, Whiteladies Road, Bristol, 8.

Edwin M. Tucker (Electrical), Ltd.—Registered 18th November. Capital £200. Manufacturers and repairers of and dealers in dynamos, motors, armatures, etc. Directors: E. M. Tucker, J. R. Tucker, and Mrs. A. Tucker. Regd. office: 49, London Wall, E.C.2.

D. Lee & Co., Ltd.—Registered 17th November. Capital £6,000. Manufacturers of and dealers in radio sets, transmitting and television sets, etc. Directors: D. Lee, Miss E. Lee, and Mrs. J. Barras. Regd. office: 117, High Street, Wombwell, nr. Barnsley.

Liquidations

A. R. Burns & Son, Ltd., electrical contractors and radio engineers, Western Road, and Ferry Road, Shoreham-by-Sea.—A meeting of creditors was held recently when a statement of affairs was presented which disclosed liabilities amounting to £4,478, and a deficiency as regarded the creditors of £2,965. The issued share capital of the company amounted to £785, and, so far as the shareholders were concerned, there was a total deficiency of £3,750. The necessary resolution had been passed by the shareholders and the creditors decided to confirm the voluntary of the company with Mr. A. E. Orbell, of 6 and 7, Old Steine, Brighton, as liquidator, together with a committee of inspection.

Bankruptcies

L. O. Richardson, The Bungalow, Norway Lane, Littlehampton, electrical contractor.—Last day for receiving proofs for dividend 20th December. Trustee, Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton.

L. E. Lawson, previously carrying on business at 1, Northam Road, Six Dials, Southampton, under the name of Lawsons Radio, radio and electrical engineer.—First dividend of 3s in the £, payable 20th December, at the offices of Albert A. Henley & Co., 19-20, Grosvenor Place, London, S.W.1.

F. Cresswell, carrying on business at Market Chambers, Mansfield, Notts, electrical engineer.—Supplemental dividend of 11s 1d in the £, payable 15th December at the Official Receiver's office, 22, Regent Street, Park Row, Nottingham.

J. V. Figgins, 3, Pottery Terrace, Alexandra Road, Newport, Mon, electrical engineer.—First and final dividend of 20s in the £ and 1⅞ per cent interest on account of 4 per cent statutory interest, payable 17th December at the Official Receiver's office, 34, Park Place, Cardiff.

Egyptian Electrical Imports

IMPORTS of electrical equipment into Egypt increased by about 80 per cent between 1947 and 1948, the total value rising to £E5,524,000. The chief items in 1948 with notes of increases or decreases compared with 1947 are shown in the accompanying table. It will be seen that the trade in wires and cables, and telegraph and telephone apparatus was specially active. Great Britain's share was well maintained generally, with Belgium and Italy competing again in some lines. Immediately after sterling was devalued last September the Egyptian £ (20s 6d) was cut proportionately.

Class of Goods and Supplying Countries	1948 £E(000)	Inc. or dec. on 1947 £E(000)
Generators, motors and transformers, 1,000 kW. or over	163	+ 67
From Britain	75	+ 36
,, *Switzerland*	44	+ 8
Ditto, 50 to 1,000 kW.	338	+147
From Britain	202	+ 79
,, *Belgium*	21	+ 21
Ditto, less than 50 kW.	214	+107
Accumulators and parts	141	+ 68
From Britain	111	+ 84
,, *United States*	13	− 22
Dry batteries and parts	153	+106
Fans	58	+ 28
Radio valves	101	+ 25
Electro-medical apparatus	110	+ 23
Electric lamps up to 40 W.	51	+ 14
Ditto, 40 to 100 W.	24	+ 12
Ditto over 100 W.	20	—
Telegraph and telephone apparatus ordinary and parts	328	+258
From United Kingdom	155	+114
Radio receiving sets	487	+ 77
From United Kingdom	313	+117
,, *United States*	32	− 45
,, *Holland*	113	+ 15
Radio fittings and parts	88	+ 11
Irons	19	− 1
Insulated tubes metal-covered	42	− 50
Signalling apparatus	19	+ 15
Refrigerators	267	+178
Other domestic apparatus	92	+ 16
Cable, insulated, submarine and underground	838	+591
From Britain	418	+305
Wire and cable, electric, unspecified and parts	864	+612
From Britain	231	+128
,, *Italy*	44	+ 44
Unspecified electrical apparatus	1,132	+324

FINANCIAL SECTION

STOCKS and SHARES

STOCK Exchange markets look like finishing the year on a reasonably firm note, although recent experience has shown how rapidly the financial outlook can change, with correspondingly abrupt movements in the prices of stocks and shares. New Zealand has just returned a National Government, in the place of the Labour Administration which had been in power for fourteen years. This change-over provided a hardening element to Stock Exchange prices. Prices hold their previous ground; there is rather a more confident feeling on the part of capital available for investment.

Gilt-edged Recovery

Recovery in the price of Government securities began a month ago, upon the materialization of Treasury support. The impression that the Government stands ready to defend at least the present line has apparently induced the investment of capital sums which were being held aloof during the demoralized slump of early autumn. With other factors, the result is seen in, for instance, the month's rise of British Electricity 3 per cents 1968/73 from 90¼ to 96½; of the 1974/77 issue from 89 to 95½; and of British Transport "threes", 1978/88, from 85¼ to 91 x.d. In the same period, 3½ per cent War Loan has moved from 88 to 93¾. The market continues in a somewhat sensitive state: prices droop when business falls away.

The Week's Fluctuations

Defeat of the Cable & Wireless (Holding) scheme was very decisive, and shareholders now await details of the new plan which the directors have promised to produce. The market effect was to put up the price of the ordinary stock by 5½ points to 235½, the preference remaining unchanged at 99. British Electric Traction deferred, 1475, is 50 points higher. Amongst other rises, Tube Investments stand out with a gain of 2s 6d to 5.13/16. De la Rue, 23s 3d, are 2s up. E.M.I., 16s 3d, E. K. Cole, 13s 9d, British Insulated Callender's, 32s, Henleys, 22s 6d, Johnson & Phillips, 60s, show gains of 1s or 1s 3d. Ever Ready improved to 27s 6d, Crompton Parkinson to 24s 3d. Ericsson, 38s 3d, Brush, 6s, Mather & Platt, 47s 3d, are all better. Greenwood & Batley at 37s 6d are ½ down. International "T. & T.", 19, have risen half a dollar; Oriental Telephones, 43s 9d, are a little lower.

G.E.C.'s Borrowing Powers

There is no indication, as yet, of the type of issue which the General Electric Co., Ltd., has in mind in connection with the proposal for a doubling of the borrowing powers. These are ordinarily limited by the existing articles to the amount of the authorized capital, at present £11.6 millions. The balance sheet drawn up last March included overdrafts of £7.3 millions, which will presumably have been replaced by July's private issue of £8 millions in 3½ per cent 10-year loan stock. As a result of the expansion of business and the rise of prices, states the company, it will be necessary before long to exceed the present limit. In conformity with the rest of the industrial market, the ordinary shares are 2s better at 74s 6d, giving a 4¾ per cent return on the last dividend of 17½ per cent.

Reliance-Clifton Cables

General Gas & Electricity Company, having lost their gas undertakings, changed their name last month to Reliance-Clifton Cables & Industrial Products, and now carry on the electrical manufacturing business through the subsidiary Clifton Securities. Accounts published in October showed the latter's results separately; the net profit represented earnings of nearly 100 per cent on the £157,000 ordinary capital of the holding company, which paid a 25 per cent dividend. Reliance-Clifton's 5s ordinary shares are quoted (still, incidentally, in the gas section of the Stock Exchange Official List) at 17s 6d. The 5 per cent preference shares are occasionally on offer at about 18s 3d.

Miscellaneous Matters

Pye 5s deferred shares have not been seriously unsettled by news of the big fire at the Cambridge stores; the price came back 6d, to 25s 9d. Last week's television news also included the announcement of English Electric's entry into the television field with a 12in by 10in set. Production has started in conjunction with the subsidiary, Marconi's Wireless Telegraph, and first deliveries are expected before Christmas. English Electric ordinary shares at 42s 6d are on a 4¾ per cent yield basis. Vactric's £340,000 loan from the Government was the subject of a recent Parliamentary question as to the time for its repayment. The Government is prepared to wait until it can be repaid without doing any damage. The company's shares, now 11s 3d, have recovered half-a-crown of last month's relapse. Cossor at 6s 3d and Scophony at 3s 6d have hardened.

Next Week's Events

Monday, 12th December

BATH.—Technical College, 6 p.m. I.E.E. Western Centre. "The Phase/Neutral System of Supply for Rural h.v. Distribution," by G. T. Garwood and G. J. Websdale.

BIRMINGHAM.—Grand Hotel, 6.15 p.m. Birmingham Electric Club. Members' Brains Trust.

LEEDS.—Lighting Service Bureau, 24, Aire Street, 6 p.m. Illuminating Engineering Society, Leeds Centre. "Life within a Lighthouse," by J. T. Bowen.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. "Trolley Bus Overhead Equipment," by A. D. Dix.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road. I.E.E. North Eastern Centre. Jubilee Lecture by P. V. Hunter.

RUGBY.—Electricity Showrooms, High Street, 6.30 p.m. I.E.E. Rugby Sub-Centre. "A Storage System for Use with Binary Digital Computing Machines," by Professor F. C. Williams and T. Kilburn.

Tuesday, 13th December

BELFAST.—Queen's University, 6.45 p.m. I.E.E. Northern Ireland Centre. "The Measurement of Light and Colour," by G. T. Winch.

CAMBRIDGE.—Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. Address by R. T. B. Wynn, chairman of the Radio Section.

LEEDS.—Yorkshire Electricity Board Offices, 1, Whitehall Road, 6.30 p.m. "Selection of Transformers for Use in Distribution Networks, with special reference to the New Low-Voltage Standard of 240 Volts," by E. Tobin.

LONDON.—Savoy Place, London, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "A Simplified Method for Checking the Orientation of the Optic Axis of Meter Jewels," by S. F. Knight.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6 p.m. Illuminating Engineering Society. "The Operation and Maintenance of Fluorescent Lamp Installations," by W. A. R. Stoyle and G. D. Jones-Thomas.

47, Belgrave Square, S.W.1, 5.30 p.m. Institute of Physics (Electronics Group). "The Nervous System as an Electrical Machine," by Dr. W. G. Walter.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North Western Measurements Group. "Recent Developments in Comparative Methods of Testing a.c. Electricity Meters," by S. F. Musson and R. E. Mell.

WIMBLEDON.—Compton Hall, Compton Road, 8.15 p.m. A.S.E.E. South West London Branch. "Soil and Greenhouse Heating," by E. W. Golding.

Wednesday, 14th December

BOURNEMOUTH.—Grand Hotel, 6.30 p.m. I.E.E. Southern Centre. "The Phase/Neutral System of Supply for Rural h.v. Distribution," by G. T. Garwood and G. J. Websdale.

BRADFORD. — Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Radio Frequency Heating," by E. T. Norris.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. "Interference between Power Communication Systems," by J. Banks.

LONDON.—Savoy Place, London, W.C.2, 5.30 p.m. I.E.E. Supply Section. "The Performance of the British Grid System in Thunderstorms," by Dr. J. S. Forrest.

NORTHAMPTON.—Northampton and District Electrical Association. "I.E.E. Regulations."

SHEFFIELD.—Grand Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "Sub-stations, with particular reference to Yorkshire Practice," by L. H. Fuller and C. R. Clarke.

Thursday, 15th December

BRADFORD. — Yorkshire Electricity Board Offices, 7.30 p.m. Illuminating Engineering Society, Bradford Group. "Lamps, Old and New," by R. Freestone.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "The Detection by Oscillographic Methods of Winding Failures during Impulse Tests on Transformers," by E. C. Ripon and G. H. Hickling.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5.30 p.m. Electrical Association for Women. Fourth Caroline Haslett Trust Lecture, by Miss Elizabeth Gwillim.

Caxton Hall, S.W.1, 2.30 p.m. Diesel Engine Users' Association. "Report on Heavy-Oil Engine Working Costs, 1947-48."

London School of Hygiene and Tropical Medicine, Gower Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers. "Electronics in Aircraft Design, by A. L. Whitwell.

Friday, 16th December

LEICESTER.—College of Technology, 6.30 p.m. I.E.E. East Midland Centre (joint meeting with the Leicester Association of Engineers). "Tidal Power and the Severn Barrage," by H. Headland.

LONDON.—At the Royal Society of Arts, Adelphi, W.C.2, 7.30 p.m. Junior Institution of Engineers. Inaugural meeting of the 69th Session. Presidential address on "Mainly About Steel," by A. Roebuck.

NEWCASTLE-ON-TYNE.—King's College, 7 p.m. I.E.E. North Eastern Students' Section. "The Development and Future of Britain's Key Industries," by W. G. Bryce.

Saturday, 17th December

BRADFORD.—Yorkshire Electricity Board Offices, Sunbridge Road, 2.30 p.m. I.E.E. North Midland Students' Section. "Electric Shock," by T. J. Wynn.

E.I.B.A. Functions

TWO functions have been arranged early in the New Year in aid of the funds of the Electrical Industries Benevolent Association. On 20th January there will be an E.D.A. Carnival at Newcastle-on-Tyne, and on 3rd February, the Derbyshire Branch of the E.I.B.A. is holding its annual dinner and dance in Derby.

The Year's Progress

Manufacturers' Work Completed During 1949

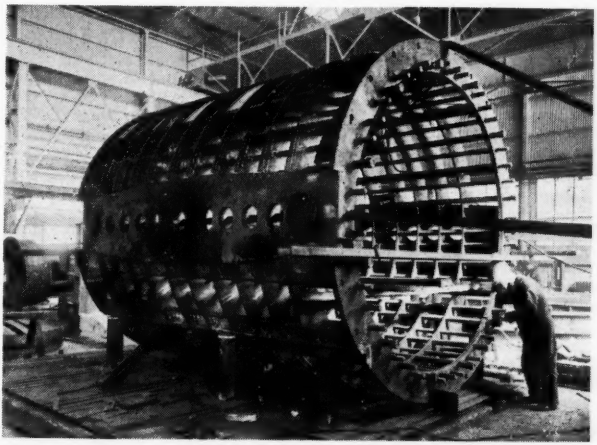
ORDERS received this year by C. A. Parsons & Co., Ltd., for turbo-alternators, required mainly for Commonwealth countries, totalled approximately 700,000 kW. The machines vary in size from industrial back pressure sets of 2,500 kW up to large single 100,000 kW sets for the Toronto power station of the Ontario Hydro-Electric Power Commission; when installed these will be the largest turbo-alternators in Canada. The order for the first machine was placed on 1st February, and the accompanying photograph taken on 3rd October shows the stator casing under construction.

A number of 30,000 and 50,000 kW turbo-alternators have been ordered for Australia and two 45,000 kW machines for South Africa will be the largest in the Union. For Southern Rhodesia a 30,000 kW set has been ordered, for the Lebanon a 15,000 kW set and for the Electricity Supply Board, Dublin, two 30,000 kW sets.

Machines completed on site or put into commercial operation during the past twelve months have included the sixth 53,500 kW set at Hams Hall "B" power station, Birmingham, the second 22,500 kW machine at Valley Road, Bradford, and 50,000 kW sets at Rotherham and Dunston. At Ballylumford, Northern Ireland, the first of two 31,500 kW sets was officially put into operation on 2nd June by Lady Brooke. In Canada, machines varying from 1,500 kW up to 30,000 kW have been put into operation; the latter was installed at Edmonton and is the largest so far put into operation in Canada.

The building of new, and extensions to existing, power stations in this country, resulted in a number of orders for transformers ranging between 10 and 75 MVA for up to and including 132 kV.

For use in a new power station being constructed in Eire, an order has been received for two 35 MVA at 10/40 kV water-cooled generator transformers, two of 8 MVA at 40/3.5 kV and two of 3 MVA at 10/3.5 kV, station transformers, each fitted with on-load voltage regulating equipment, and six 500 kVA units.



Stator casing for Toronto 100 MW alternator at makers' works in October

A considerable number ordered for export includes two of 12 MVA and two of 10 MVA, four of 6 MVA at 33/11 kV fitted with on-load tap changing gear, and two of 2,500 kVA at 66/6.6 kV for Australia; a 26 MVA at 60/11 kV transformer and three of 1,500 kVA are on order for Portugal; smaller sizes are going to the Union of South Africa and India.

The number of orders received for standard distribution transformers con-

tinues to increase and many large bulk contracts are in course of production.

Among 132 kV, 66 kV and 33 kV transformers despatched from the works, or put into commission, was one which is directly coupled to a 50 MW Parsons generator at the Prince of Wales power station at Rotherham for stepping up from 11 to 132 kV; it is fitted with remote electrically controlled resistor type of on-load voltage regulating equipment for variation of plus and minus 10 per cent in 14 steps on the 132 kV side.

The Mirror Department has been rehoused in new premises at Heaton South and reorganized to increase the production of glass for cinema reflectors, the split type of para-ellipsoidal reflector for vessels navigating the Suez Canal, searchlight reflectors ranging in size up to 60in diameter, and large paraboloidal reflector panels for a number of lighthouses, which are used instead of the previous system of dioptric lenses and prisms.

Canada's Electrical Imports

FIGURES FOR FIRST HALF OF 1949

IMPORTS of electrical apparatus into Canada during the six months ended June last were valued at $34,213,000 compared with $34,625,000 during the corresponding period of 1948. The principal items are shown in the accompanying table together with notes of increases or decreases compared with 1948. The greatest variations were in the trade in power plant, there being decreases in dynamos and motors (other than small machines). Increases took place in the imports of transformers, and of special switchgear for coal mines (in which the United States figured as a competitor with the United Kingdom). British trade declined in dynamos, special generators and radio goods but improved in motors, transformers and telegraph and telephone apparatus; in the last-named the share of the United States declined. In general United States business maintained its preponderance.

Class of Goods and Supplying Countries	Jan.-June 1949 $000	Inc. or dec. on Jan.-June 1948 $000
Batteries, flashlight and pts. ...	35*	+ 4
Batteries, hearing aids and pts. ...	69*	†
Batteries, primary, n.o.p. ...	75	+ 5
Batteries, storage	386	+ 50
From United Kingdom ...	50	+ 18
„ United States ...	336	+ 31
Heating apparatus	214	— 83
From United Kingdom ...	1	— 7
„ United States	213	— 76
Dynamos and pts.	1,743	— 445
From United Kingdom ...	88	— 284
„ United States	1,646	— 168
„ Switzerland	1	+ 1
„ Australia	1	+ 1
Torchlights, flashlights, side and tail lights	237	— 148
From United Kingdom ...	36	+ 9
„ United States	199	— 150
Lighting fixtures and appliances ...	1,558	+ 1
From United Kingdom ...	28	+ 10
„ United States	1,398	— 66
Electric meters	596	+ 178
From United Kingdom ...	71	— 2
„ United States	505	+ 160
Motors valued at less than $10 ...	215*	+ 58
Motors, other, and complete parts	4,301	— 236
From United Kingdom ...	574	+ 215
„ United States	3,696	— 467
Rheostats, controllers, etc. ...	2,395	+ 387
From United Kingdom ...	69	— 7
„ United States	2,302	+ 393
„ Switzerland	22	—
Electric irons	81	— 40
From United Kingdom ...	34	+ 18
„ United States	46	— 58
Sockets, outlets, etc.	283	— 148
Transformers and pts.	895	+ 183
From United Kingdom ...	222	+ 26
„ United States	635	+ 130
Switchgear for use underground in coalmines	185	+ 155
From United Kingdom ...	107	+ 77
„ United States	78	+ 78
Switches, switchboards, etc. ...	2,429	— 207
From United Kingdom ...	103	— 61
„ United States	2,270	— 144
„ Switzerland	56	+ 1
Telegraph apparatus	1,009	+ 462
From United Kingdom ...	211	+ 177
„ United States	797	+ 183
Radio valves	617*	+ 174
Radio apparatus, n.o.p.	3,612	+ 525
From United Kingdom ...	134	— 554
„ United States	3,473	+ 1,075
Telephone apparatus	3,332	— 173
From United Kingdom ...	710	+ 188
„ United States	2,622	— 347
Elec. steam generators and pts. of a kind not made in Canada ...	899	— 889
From United Kingdom ...	431	— 641
„ United States	468	— 161
Electric dry shavers	220	— 59
From United Kingdom ...	20	+ 20
„ United States	200	— 79
Electric precision instruments ...	848	+ 63
From United Kingdom ...	53	+ 11
„ United States	791	+ 53
Electrical apparatus n.o.p. ...	3,995	— 185
From United Kingdom ...	91	+ 61
„ United States	3,892	— 31

* All or nearly all from U.S.A.
† Comparative figures not available.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, W.C.2.

1943

10565/7. Submarine Signal Co.—Apparatus for transmitting and receiving compressional wave energy. 22nd July and 2nd August, 1939. (632284/6.)

1944

21363. British Thomson-Houston Co., Ltd.—Elastic-fluid turbines. 1st November, 1943. (632287.)

1945

1856. British Thomson-Houston Co., Ltd. (General Electric Co.). — Thermionic pulse generating circuits. 23rd January, 1945. (632146.)

18793. British Thomson-Houston Co., Ltd.—Electric induction apparatus. 28th July, 1944. (632148.)

23395. British Thomson-Houston Co., Ltd.—Electric valve control circuits particularly suitable for the control of intermittently energized load circuits such as welding circuits. 12th September, 1944. (632150.)

27132. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 28th October, 1944. (632293.)

28862. Submarine Signal Co.—Apparatus for transmitting and receiving compressional wave energy. 22nd July, 1939. (Divided out of 632285.) (632294.)

31596. Eurich, J. E. G., and Eurich, J. V.—Electric motors and generators. 23rd November, 1945. (632295.)

1946

4032. British Thomson-Houston Co., Ltd., and Owen, C. E.—D.c. amplifying systems involving a conversion to a.c. 8th February, 1946. (632151.)

17208. Williams, F. C., and Kilburn, T.—Thermionic valve circuits. 6th June, 1946. (632159.)

18438. Philips Lamps, Ltd.—Devices for emitting directional high-frequency radiation. 20th March, 1942. (632078.)

19291. Bendix Aviation Corporation. — Follow-up system stabilizing circuit. 28th June, 1945. (632160.)

25070. Submarine Signal Co.—Wide-band amplifiers. 4th September, 1945. (632162.)

25946. International Business Machines Corporation. —Distributors for sequentially controlling different circuits. 18th October, 1945. (632165.)

26161. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Blocking-layer cells. 7th December, 1942. 7th December, 1942. (632166.)

28409. International Business Machines Corporation. —Electrical circuits and electronic tubes employed therein. 27th November, 1945. (632168.)

29421. Philips Lamps, Ltd.—Superheterodyne receivers with automatic frequency control. 16th April, 1943. (Addition to 616358.) (632169.)

31591. Jackson, H.—Electric hand lamps and the like. 24th October, 1946. (632302.)

32710. Philips Lamps, Ltd.—Circuit arrangements for providing a sawtooth-like current in the deflecting coils of a cathode-ray tube. 7th November, 1945. (632175.)

34059. Eurich, J. E. G., and Eurich, J. V.—Windings for electric motors and generators. 23rd November, 1945. (Divided out of 632295.) (632307.)

34310. Philips Lamps, Ltd.—Devices for making short-time exposures by means of X-rays. 21st May, 1943. (632308.)

35777. Advance Components, Ltd., Stapleton, A. W., and Cox, E. F.—Electric dry shavers. 3rd December, 1946. (632184.)

36162. Kolster-Brandes, Ltd., and Griffin, L. J.—Radio receiving sets and cabinets therefore. 6th December, 1946. (632185.)

36618. Baird, Ltd., J. L., and Anderson, E. G. O.—Thermionic amplifiers. 11th December, 1946. (632186.)

36860. Kapella, Ltd., and Reason, R. E.—Electrical measuring apparatus. 13th December, 1946. (Cognate application 746/48.) (632353.)

36872. British Thomson-Houston Co., Ltd.—Vertical shaft motors. 15th December, 1945. (632187.)

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2768. Philips Lamps, Ltd. — Superheterodyne receivers. 15th February, 1944. (632199.)

3622. Metcalfe, C., and Lockwood, P. W.—Suction cleaners. 7th February, 1947. (632200.)

4365. British Thomson-Houston Co., Ltd. (General Electric Co.).—Electric capacitors. 14th February, 1947. (632203.)

5560. Schweizerische Lokomotiv-und Maschinenfabrik.—Mounting of the motor for electrically driven rail vehicles. 28th February, 1946. (632206.)

5658. Westinghouse Electric International Co.—Magnetrons. 31st October, 1945. (632210.)

5780. Anglo-Iranian Oil Co., Ltd., Howes, D. A., and Pethrick, S. R.—Electrical insulating materials. 28th February, 1947. (632211.)

5895. British Tabulating Machine Co., Ltd.—Thermionic valve commutators or the like. 1st March, 1946. (632212.)

6055. Dymond, E. A. W.—Intercommunication telephone apparatus. 3rd March, 1947. (632216.)

7301. Standard Telephones and Cables, Ltd.—Centering device for telephone switches and the like. 18th April, 1946. (632220.)

8665. Metropolitan-Vickers Electrical Co., Ltd., Walsh, N. A., and Shand, G.—Variable resistances and potentiometers. 31st March, 1947. (632319.)

8886. Standard Telephones & Cables, Ltd.—Mixer circuit. 8th December, 1945. (632224.)

10100. Pittsburgh Plate Glass Co.—Formation of conducting coatings on glass. 14th May, 1946. (632227.)

10242. Metropolitan-Vickers Electrical Co., Ltd., and Miller, C. W.—Indicating apparatus for radar. 17th April, 1947. (632228.)

10243. Metropolitan-Vickers Electrical Co., Ltd., Miller, C. W., and Crowley-Milling, M. C.—Indicating apparatus for radar. 17th April, 1947. (632229.)

10654. American Electric Metal Corporation.—Producing by infiltration composite shaped bodies such as machine elements. 23rd April, 1946. (632323.)

12457. Beer, W. R.—Resilient supporting means for flexible electric conductors. 1st August, 1946. (632326.)

12475. Sletner, P. G.—Electrical heating cables. 15th May, 1942. (632235.)

12543. Automatic Telephone & Electric Co., Ltd., and Baker, G. T.—Counting arrangements. 9th May, 1947. (632327.)

16901. Westinghouse Electric International Co.—Alternating current measuring instruments. 17th September, 1941. (632334.)

21688. Sylvania Electric Products, Inc.—Electric lamp socket. 19th July, 1940. (632254.)

21705. United Insulator Co., Ltd., and Hammond, P. A.—Electrical condensers. 7th August, 1947. (Addition to 579576.) (632344.)

21717. Sperry Gyroscope Co., Inc.—Dynamo-electric machines. 20th June, 1945. (632255.)

21719. Libbey-Owens-Ford Glass Co.—Electrically conducting films and method of application. 5th October, 1942. (632256.)

23550. Horstmann Clifford Magnetics, Ltd., Horstmann, F. O., and Clifford, C. F.—Electric motors. 26th August, 1947. (Cognate application. 27144/47.) (632264.)

26047. General Railway Signal Co.—Relays. 27th September, 1946. (632271.)

26275. Meaker, J. W.—Semi-automatic apparatus for electro-perforating shoes and similar articles. 9th April, 1947. (632273.)

28742. General Motors, Ltd., Blazey, S. H., and Hopkins, R. T.—Speed control device for electric motors. 28th October, 1947. (632276.)

30145. General Electric Co., Ltd., Hodgson, J. M., and Vernon, G. T. R.—Machines for orientating cylindrical objects. 12th November, 1947. (632105.)

30665. Allmanna Svenska Elektriska Aktiebolaget.—System for controlling separately excited direct-current motors. 6th December, 1946. (632278.)

31185. P.E.C.O. (Electrical Contractors), Ltd., and Reece, M. P.—Fire alarm apparatus. 25th November, 1947. (632279.)

32163. General Electric Co., Ltd., and Smith, R.—High-frequency electric induction heating apparatus. 5th December, 1947. (632111.)

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384. Allday & Son (1922), Ltd., H., and Bain, R.—Cable clamping means for electric circuit junction boxes and other fittings. 6th January, 1948. (632005.)

529. General Electric Co., Ltd., and Bryden, J. E.—Electrical phase shift devices. 7th January, 1948. (632007.)

606. Superheater Co., Ltd., and Southcott, L. C.—Water tube boiler and steam superheater arrangements. 8th January, 1948. (632011.)

750. Carr Fastener Co., Ltd., and Heath, C. W.—Thermionic valves, plugs and like electrical devices provided with guide keys. 9th January, 1948. (632015.)

848. Reast, A. F., and Bishop, G.—Electric cable coupling devices. 10th January, 1948. (632018.)

861. Singer Manufacturing Co.—Electric motor drive for sewing-machines. 17th September, 1947. (632019.)

911. Watliff Co., Ltd., and Hinchcliff, A. O.—Electric commutators. 12th January, 1948. (632020.)

1028. Glover & Co., Ltd., W. T., and Dixon, N.—Manufacture of electric cables. 13th January, 1948. (632022.)

1126. Philips Electrical, Ltd.—Circuit arrangements for the high-frequency heating of non-conductive material. 17th January, 1947. (632023.)

1275. British Mechanical Productions, Ltd., and Cook, C. R.—Wire-joining connectors. 15th January, 1948. (632029.)

1363. P.A.M., Ltd., and Holt, H. B. W.—Devices for limiting electric current supply. 16th January, 1948. (632033.)

1466. Rublee, N. C.—Insulated nails. 18th July, 1946. (632038.)

1467. Rublee, N. C.—Insulating staples. 31st July, 1947. (632037.)

1561. Rotax, Ltd., and Robinson, E. E.—Electric ignition or other transformer coils. 19th January, 1948. (632044.)

1786. Craig & Derricott, Ltd., and Derricott, E. L.—Terminals for electric conductors. 21st January, 1948. (632048.)

1879. British Insulated Callender's Cables, Ltd., Dixon, H. J., Gauterin, A. G., and Somerford, H. W.—Two part couplings for releasably connecting electric cables together or to associated apparatus. 21st January, 1948. (632052.)

1955. Rotax, Ltd., Cullen, H. F. T., and Bergen, S. A.—Alternating electric current generators. 22nd January, 1948. (632056.)

2013. British Thomson-Houston Co., Ltd.—Electric control devices having indicating means. 22nd January, 1947. (632059.)

2027. Young Accumulator Co., Ltd., and Callendar, L. H.—Electrical secondary batteries. 22nd January, 1948. (632061.)

2050. Trainor, E., and Trainor, L.—Spring clip-on electrical heater for water pipes. 23rd January, 1948. (632063.)

2437. Standard Telephones & Cables, Ltd., and Wintle, M. F.—Adjustable tapped inductance coil. 27th January, 1948. (632071.)

2587. Dawe Instruments, Ltd., Dawe, F. W., and Osborne, F. A. T.—Electric plug-and-socket connectors. 28th January, 1948. (632124.)

2602. Telefonaktiebolaget L. M. Ericsson.—Electrical connections. 30th January, 1947. (632126.)

2628. Kay, S.—Electrical connectors. 29th January, 1948. (632129.)

2660. Epsem, Ltd., and Wilson, J. M.—Electrically heated soldering irons. 29th January, 1948. (632132.)

2682. Dubilier Condenser Co. (1925), Ltd., Coursey, P. R., Munday, C. H., and Gough, K. A.—Manufacture of electrical condensers. 29th January, 1948. (Addition to 611900.) (632134.)

2695. Westinghouse Electric International Co.—Selenium rectifiers. 20th March, 1947. (632135.)

2724. Cook, C. R.—Electric plug-and-socket switches. 29th January, 1948. (632138.)

2804. Fairweather, W. C. (Singer Manufacturing Co.).—Electric sewing-machine cabinets with built-in motor controllers. 30th January, 1948. (632073.)

2853. British Thomson-Houston Co., Ltd., and Rushforth, L.—Production of hollow-annular glass bodies. 30th January, 1948. (632139)

29365. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—Means for regulating the saturation current of hot cathode valves. 27th February, 1943. (Divided out of 626686.) (632142.)

Amended Specifications

596439. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—High-frequency discriminators.

603539. Crabtree & Co., Ltd., J. A., and another. Fused pin plugs for electric couplings.

609690. Sampietro, A. C., and another.—Electromagnetic clutches.

613482. Donovan Electrical Co., Ltd., and another. Switch fuses.

617405. Sampietro, A. C., and another.—Control of electrically actuated clutches adapted to couple a variable-speed motor to a driven element.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 30th November.

CELTA. No. 678,172. Class 9. Electric flat irons, vacuum cleaning machines, and polishing machines for domestic purposes.—The Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

SYMAX. No. 677,872. SYMACE. No. 677,874. Class 17. Electrical insulation material, electrical insulation parts and electrical insulators.—H. D. Symons & Co., Ltd., Park Works, Park Road, Kingston Hill, Surrey.

Electricity for Coal Mines

INCREASING use of electricity in coal mining was forecast by Mr. R. A. Moore, deputy production director of the Scottish Division of the National Coal Board, at the annual dinner in Glasgow of the West of Scotland Branch of the Association of Mining Electrical and Mechanical Engineers.

Mr. Moore said there was no doubt that the smoking chimney of the old colliery would become a thing of the past. A decision had to be made, however, as to who was to provide the power for the collieries—the National Coal Board or the British Electricity Authority. While that was a matter of high policy, it was nonsensical to his mind, in the case of two national industries, that the N.C.B. should be doing any power generation on a major scale.

Mr. Richard Crawford, chief electrical engineer in London for the N.C.B., said that the next step towards enhancing the status of the mining electrical and mechanical engineer would be the granting of official certificates, after which they could turn their efforts to securing a royal charter.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—3rd February. City Electric Light Co., Ltd. 6.6 kV and 11 kV outdoor circuit breakers. (C.R.E. (I.B.) 34598/49. Ten/809).*

Bath.—Education Committee. Contractors desirous of tendering for Phase II of the electrical installation at Moorlands Estate new junior school must submit their names to the architects by 21st December. (See this issue.)

Belfast.—6th January. Electricity Department. Electrical stores. (See this issue.)

Cardiganshire.—14th December. Education Committee. Wiring Penmorfa School and school house for electric light and power. County architect, County Hall, Aberayron.

Carluke.—20th December. Southern Lanarkshire Hospitals Board of Management. Rewiring of one block of eight wards; and additions and alterations to the electrical wiring in three blocks of eight wards each, and the nurses' home of 16 units, at the Law Hospital. H. K. Mitchell, secretary to the Board, Law Hospital.

Docking.—19th December. R.D.C. Wiring for electricity 88 dwellings on eight sites. G. E. Gibson, housing officer, Council Offices, Station Road, Docking, King's Lynn.

Durham.—County Council. Electrical installation at Jarrow Simonside county school. County architect, Court Lane, Durham.

Edinburgh.—31st December. North of Scotland Hydro-Electric Board. 33 kV and lower voltage overhead lines. (See this issue.)

7th January. North of Scotland Hydro-Electric Board. 33 kV and lower voltage overhead lines. (See this issue.)

Egypt.—CAIRO.—18th April. Ministry of Public Works, Mechanical and Electrical department. Electric pumping station and cable line at Ameria, Qualubia Provinces. (C.R.E. (I.B.) 32698/49. Ten/1789.)*

Fraserburgh.—15th December. Town Council. Electrical work in connection with the erection of 32 houses. Burgh surveyor, Burgh Chambers.

Merton and Morden.—28th December. U.D.C. Street lighting installation. (See this issue.)

New Zealand.—WELLINGTON.—7th March. State Hydro-Electric Department. Three 11 kV voltage regulating outdoor transformers. (C.R.E. (I.B.) 34566/49. Ten/807.)*

14th March. One 45-ton, 4-motor electric overhead crane. (C.R.E. (I.B.) 34563/49. Ten/805.)*

2nd May. Turbines and generators for the Whakamaru power station. (C.R.E. (I.B.) 34083/49. Ten/800.)*

Portugal.—LISBON.—6th January. Directorate General of Colonial Development. Material for the new distributing system of electric power to Lourenco Marques, Portuguese East Africa. (C.R.E. (I.B.) 33760/49. Ten/813.)*

Uruguay.—MONTEVIDEO.—27th April. Usinas Electricas y Telefonos del Estado. Supply of 8,000 6 kV and 17,000 15 kV porcelain insulators. (C.R.E. (I.B.) 34074/49. Ten/803.)*

* Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1. Victoria 9040.

Orders Placed

Herts.—County Council. Electrical installations at the Batford primary school, Harpenden (£1,224).—E. Wight & Co.

Kingston-on-Thames.—Corporation. Electrical work at Kingston Hill flats (£5,994).—South Eastern Electricity Board.

London. — KENSINGTON. — Borough Council. Electric time switches for street lighting (£1,392).—Horstmann Gear Co.

Newcastle-on-Tyne.—City Council. Installation of electric lighting at the package dues and quaymasters' offices, Princes Buildings (£153).—Fletcher Brothers.

Northumberland.—Education Committee. Electrical installations in schools.—Whitley South county primary (£330), J. W. Johnson, Ltd., Whitley Bay, Lynemouth county primary, kitchen and dining rooms (£346).—Robson and Coleman, Ltd, Newcastle-on-Tyne. Newburn Hall county primary, kitchen and dining rooms (£475), and Walbottle R.C. county primary, kitchen and dining rooms (£224).—Falconar Cross & Co., Ltd., Newcastle-on-Tyne.

Poplar.—Borough Council. Electrical installations in twenty-four flats at Stafford Road (£1,240).—Electro Installations (London), Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Schools, Cornhill and Cummings Park; J. A. O. Allan, Ross & Allan, architects, 10, Bon Accord Square.

Anglesey.—Houses (92), Gwaith Hills, Amlwch; E. Ditton-Jones, clerk to U.D.C., Council Offices, Trehinon, Amlwch.

Ashby-de-la-Zouch.—Houses (28), Westfield, for U.D.C.; T. Barker & Sons, 14, Swan Street, Loughborough.

Ashton-under-Lyne. — Cleansing depot (£34,000); borough surveyor.

Aylesbury.—Houses (60), California estate; C. White, architect, 4, Temple Square.

Barnsley.—Secondary technical school, junction of Burton Bank Road and New Lane; borough surveyor.

Barnstaple.—Rebuilding portion of Red House, Castle Street, to form Council chamber; A. J. Dennis, building surveyor, The Red House.

Bilston.—Permanent houses (64), Stowlawn site, Section G.; A. M. Williams, clerk, Town Hall.

Birmingham. — Secondary boys' school, Turves Green; Jackson & Edmonds, 61, New Street.

Blackburn.—Primary infants' school, Longshaw; borough engineer.

Bradford.—Renovations to St. George's Hall (£86,000); city architect.

Brownhills (Staffs.).—Houses (475), Salters Road, Walsall Wood; surveyor, Urban Council Offices.

Carlisle.—Department of pathology at Cumberland Infirmary for Regional Hospital Board; F. Waddington, architect, 18, Scotch Street, Whitehaven.

Cleethorpes.—Houses (56), Love Lane Corner and Highgate; borough engineer.

Clowne.—Dwellings (62), for R.D.C.; J. Haslam and Sons, architects, Ryton Chambers, Newcastle Avenue, Worksop.

Cumberland.—Fire stations at Wigton and Cockermouth (£24,000); county architect, 15, Portland Square, Carlisle.

Dudley.—Extensions to Dudley & Staffs Technical College (£23,970); J. Webb, Ivy House Lane, Coseley, Staffs.

Durham.—Houses (248), West Sherburn and Sunderland Road estate; city engineer, Town Hall, Durham.

Eastbourne.—Houses (51) Chatfield-Davis estate and eight houses and 48 flats, Bourne Street area; borough engineer.

Gateshead.—Factory, Team Valley Trading Estate, for the Disabled Persons Employment Committee, Kenton, Newcastle-on-Tyne.

Haltwhistle.—Houses (44), Redburn, for the R.D.C.; Barwick Bros., builders, Gilsland, Carlisle.

Hebburn-on-Tyne.—Factory addition, Hedgeley Road, for Wailes Dove Bitumastic Co., Ltd.; Brims and Co., builders, City Road, Newcastle-on-Tyne.

Horbury.—Houses (52), Manor Fields; J. Brookes & Sons, Ltd., 264, Manchester Road, Huddersfield.

Huntingdon.—Combined fire and ambulance service headquarters, Hartford Road; S. J. Hands, county architect, Walden House, Huntingdon.

Ilford.—Eight-storey block of flats, Gaysham Hall site; borough engineer.

Maisonettes (36), Lancelot Road and Caterham Avenue; New Ideal Homesteads, Ltd., Mead House, South Street, Epsom.

Kendal.—Adaptations at Sedgwick House residential special school for Lancs C.C. (£23,087); Nicholson & Wright, Ltd., Lancaster.

Kidsgrove.—Houses (88), Crown Bank, for U.D.C.; R. Dayson, Wolstanton.

Kingston-on-Thames.—Crematorium on site adjoining cemetery, Bonner Hill Road; A. W. Forsdike, town clerk, Guildhall.

London.—CLAPHAM.—Flats (113), Clapham Avenue, for Wandsworth B.C.; H. Baily, architect, 31a, John Adam Street, W.C.2.

STREATHAM.—Block of 20 flats, 1177/1179, London Road; Streatham Property Investment, Ltd., 1258, London Road, S.W.16.

STOKE NEWINGTON.—Flats (28), Lordship Road, for T.C.; Howes & Jackman, architects, 1, Verulam Buildings, W.C.1.

Manchester.—Conversion of Isolation Hospital into maternity home at Bull Hill (£15,894), provision of electric cables, etc., at Queen's Park Hospital, Blackburn (£6,189), adaptation of The Mount, Accrington, as nurses' hostel (£8,150), extensions at Bank Hall Maternity Hospital (£31,142); T. Duffy, architect to Manchester Regional Hospital Board, Sunlight House, Quay Street, Manchester.

Mansfield Woodhouse.—Houses (64), Coxs Lane estate, for U.D.C.; C. H. Hill & Sons, Ltd., Mansfield.

Newbury.—Block of 26 flats, Craven Road; borough engineer.

Newcastle-on-Tyne.—Large block of flats at Longbenton for the City Council; city architect, 18, Cloth Market.

Eight-storey block of offices and shops on vacant site between Dean Street and Pilgrim Street for the Milburn Estates, Ltd.; G. S. Ash, architect, 66, Great Cumberland Place, London, W.1.

Northampton.—Sewerage and sewage disposal scheme for three parishes, with three pumping stations; C. E. Jones, clerk, 1, Cheyne Walk.

Six- and three-storey blocks of flats, Park Drive; borough architect.

Nottingham.—Houses (210), Strelley estate; J. W. Stamp & Co., Nuthall Road, Bobbers Mill.

Oldham.—Infants' school, Derker; J. Hartley, Cobden Street, Chadderton, Lancs.

Oswestry.—Houses (74), Shrewsbury Road site; E. G. Gittins & Sons.

Oxford.—Dwellings (154), Northway estate, Headington; E. G. Chandler, city architect, Town Hall.

Peterlee (Co. Durham).—Houses (64), architects' dept., Peterlee Development Corporation; Shotton Hall, Castle Eden.

Ripley.—Houses (20), Elms estate; U.D.C. surveyor.

Salop.—Proposed police divisional headquarters at Wellington & Oswestry (estimated cost £50,000); county architect, 5, Belmont, Shrewsbury.

Walsall.—Factory, Rollingmill Street; Broson & Co., 95, High Street, Hanley, Staffs.

Wellington.—Houses (34), Dawley Road, for U.D.C.; J. Brian Cooper, architect, 177, Corporation Street, Birmingham.

West Bromwich.—Children's reception centre in two blocks, Pennyhill Lane; H. Schofield, borough engineer, Town Hall.

Westbury.—Houses (26), Oldfield Park estate, for U.D.C.; G. Blair Imrie, architect, Teffont, Salisbury.

Whitworth.—Bungalows for aged persons, John Street; U.D.C. architect.

Wigan.—Extensions to Haigh Dye Works; Blue Printers, Ltd.

Workington.—Factory, Salterbeck, for Ogden & Lawson; Ronald Ward & Partners, 33, St. Georges Drive, London, S.W.1.